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Biographical Article

ROBERT VON OSTERTAG

By

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On March 24th, 1934, Robert von Ostertag celebrated his seventieth birthday, an occasion which was not allowed to pass unnoticed by his veterinary colleagues in Germany and other parts of the world, for his whole life has been spent in the advancement of veterinary science. His work and writings have held, and always will hold, a world-wide reputation for clear thinking and correct interpretation, and veterinarians the world over will always recognise the innumerable benefits which have accrued to their profession through the life of Robert von Ostertag.

Ostertag was born in Swabia, and at the age of 16 he began to study at the Stuttgart Veterinary High School and completed his veterinary education at Freiburg University. Having passed his final examinations, he assisted his brother in practice for a short time, but soon went to Berlin to enlist in a regiment of Guards. During his time in the army he also studied at the Berlin Veterinary High School and University. After leaving the army, he was appointed assistant municipal veterinary officer and later municipal veterinary officer and meat inspector in the Berlin slaughterhouse; at the same time he continued his post-graduate studies under Virchow at the Institute of Pathological Anatomy, where he also came in contact with other great scientists. At the age of 27 he went to the Stuttgart Veterinary High School as professor of contagious diseases and meat inspection, and it was here that the first edition of his famous handbook on meat inspection was completed. He only stayed one year at Stuttgart, and in the summer of 1892 was appointed to a new professorship at the Berlin Veterinary High School. This new appointment embraced a variety of subjects, such as diseases of the feet, dietetics and parasitology, but it gave him a clear insight into every aspect of veterinary work. After a few years he was able to occupy the Institute of Hygiene, built according to his own plans, and devote himself wholeheartedly to the task which attracted him most. The post-graduate courses given by him were a revolution in the teaching of veterinary hygiene, and students of all ages came to attend his lectures.

In 1907 Ostertag gave up his educational work and became an adviser to the Government and director of the Kaiser Institute of Health in Berlin. He had always taken a great interest in the study of tropical diseases and had introduced the study of tropical medicine at the Berlin Veterinary High School, so that it was not long before he was commissioned to travel in the colonies to study rinderpest, sheep pox, etc. In a short time he earned a position of authority at the Ministry of Health, chiefly owing to his quick perception, strong character and the absolute confidence which was placed in him by his superiors. Owing to the various changes which Ostertag had introduced, he was held in a certain mistrust by the agriculturalists, but it was not long before it became evident that the veterinary measures introduced by him were of great benefit to agriculture. Under his administration, the department solely concerned with contagious diseases of cattle was extended to investigate and control such diseases as tuberculosis, abortion, mastitis, swine fever, fowl diphtheria, foul brood in bees, etc., and he was decorated by the Kaiser for the great services he had rendered to veterinary science and agriculture.

His period at the Ministry of Health was interrupted by the War. At the very beginning of operations he was made Inspector-General to a Field regiment, but in October, 1914, he was appointed Director of Veterinary Services in Belgium. As the war continued and the problem of the food supply became more difficult, Ostertag was recalled to Berlin and in 1916 was given the task of regulating the meat supplies of the nation. He played a large part in the working out of the rationing system and the reorganisation of the supply and distribution of pig products. It was he who instituted the collective system of pig fattening and undertook the supply of oil of animal origin to the U-boats. He carried on these duties until the war ended. After the war he was appointed to the commission for the reorganisation of the cattle industry, and became Director of the Veterinary Department of the Ministry of Health, which post he held until his retirement from public life at the age of 70.

Ostertag has been justly called the father of modern meat inspection, but his contribution to veterinary science has extended far beyond this; moreover, he has won for veterinary medi-

cine its true position beside human medicine in the health organisation of a great nation. He may also be claimed to be the most prominent veterinarian in Germany, and it is to be hoped that he may live for many years to enjoy the rest to which he is entitled after so many years of useful and unselfish service in the pursuit of veterinary knowledge.

Review

R. VON OSTERTAG'S TEXT-BOOK OF MEAT INSPECTION

[Text-Book of Meat Inspection. R. von Ostertag. Translated by G. F. Marshall. English edition edited by T. D. Young. Pp. xi, *plus* 743; coloured plates 10; figures 247. Price 45s. Published by Baillière, Tindall & Cox, London.]

This work is an entirely new translation superseding the well-known Handbook of Meat Inspection by the same author. The former book, however, should still be retained on the book-shelf for supplementary purposes, as certain portions have not been reproduced. The present edition is probably of greater value both to the veterinary surgeon engaged in meat inspection and also to the student. It is impossible to deal in any way adequately with the excellent work by such a master of his subject as Ostertag—suffice it to say that we unhesitatingly welcome it, and recommend its use wherever matters concerning meat inspection are under review. The editor has preserved the original text as far as possible, and any differences of opinion have chiefly been made in the form of footnotes. The editing by Colonel Young has certainly rendered the book more valuable for use in Great Britain, as he has paid attention to differences of procedure in this country.

The chapter on methods of slaughtering by mechanically operated instruments includes a reference to the more recent instruments and also to the electro-lethaler, which is rapidly gaining the confidence of slaughtermen in this country. There is also added a chapter on poultry diseases, which is not in the original edition, but the chapter on fish inspection has been omitted. Without having reference to the original edition, one may perhaps regret that omission.

The value of the book is much enhanced by the introduction of a series of appendices, after the general index:—

Appendix I details the Slaughter of Animals Act, 1933.

Appendices II and III give the Public Health (Imported Food) Regulations.

Appendix IV consists of what is more popularly known as Memo. 62 (Foods).

Appendix V, Public Health (Preservatives) Act.

Appendix VI, Public Health, Meat Regulations, 1924.

Appendix VII, The Sale of Food Order.

Appendices VIII and VIIIa, Merchandise Marks Act.

Appendices IX and IXb, X, XI and XII concern the regulations in operation in the Commonwealths of Australia, New Zealand, Canada and the United States of America.

The value of the book cannot be overestimated—the plates and illustrations are excellent, and the publishers have carried through their work in conformity with their customary high standard.

General Articles

PROFESSOR DR. VON OSTERTAG AND MEAT INSPECTION

LIEUT.-COLONEL T. DUNLOP YOUNG, *O.B.E.*, M.R.C.V.S., D.V.S.M.

Late Chief Meat Inspector, Corporation of London

Meat inspection in Great Britain 50 years ago was practically an unknown science. It is difficult to ascertain why, because this important public health work had been entrusted to veterinarians in other countries since 1761.

In a few large towns, so-called meat inspectors did exist, but the qualifications for the positions were unknown quantities. Some of the officers had been for a short time in the butcher trade, and some were actually police in uniform. A Return of meat inspectors called for by the Government showed representatives of nearly every trade associated with buildings, but no veterinary surgeons, except where such members of the profession were appointed as veterinary inspectors in connection with the Diseases of Animals Acts.

Malgré the extraordinary disclosure of the Return, no steps were taken to appoint men of scientific training to carry out the work of meat inspection. It required a bombshell to stir the powers that were into action, and that happened in the publication of a book entitled "The Jungle" in the U.S.A.

Prior to that time, the late Professor Walley, of Edinburgh, tried with some little effect to have veterinary surgeons appointed as meat inspectors in Edinburgh, and he published a small but very useful handbook on Meat Inspection. The result of the publication of "The Jungle" was a very complete reorganisation of the Meat Inspection Service in the U.S.A., additional inspectors were appointed in many countries and, associated with other factors, entirely new organisations were established in other countries.

When this occurred it was necessary to look for a guide on the subject of meat inspection, and this was found in Dr. Ostertag's wonderful example of personal observations, clear deductions, collecting and tabulating of the opinions of other workers, all so carefully and explicitly detailed that his book was at once adopted as *The Text Book* for students and those engaged in this very important work.

Many books on meat inspection have been published since Ostertag's first edition, and most of the authors have acknowledged their indebtedness to Robert Ostertag. Nine editions of his book were published in Germany, and four editions in the English language, and so great was the demand for the last edition that latterly it was impossible to procure a copy at any price.

Most of our recognised veterinary authorities on the subject of meat inspection openly state that they owe much of their knowledge to two great teachers, *viz.*, Sir John M'Fadyean and Dr. von Ostertag.

Meat inspection of England, except in large towns and a few local areas, as has been stated in Government publications, is still far from satisfactory, and it appears as if another bombshell is necessary to galvanise the powers that be into establishing a uniform and scientific system of meat inspection throughout the country. It seems illogical to be so strict with the inspection of imported meat derived from countries where Government-appointed and controlled, scientifically trained officers examine all meat intended for export and yet, in our own country, thousands of animals are slaughtered weekly and pass into consumption without having been examined either *ante-mortem* or *post-mortem*.

No one has more consistently urged the necessity of scientific training for the *ante-mortem* and *post-mortem* inspection of our food animals than Dr. Ostertag, and his new work on the subject will remain not only a standard textbook, but actually an encyclopædia to which we will all turn when in doubt as to what decision we should form.

We owe to Dr. Ostertag a debt we cannot repay, but we can express our high appreciation of his great work, be proud that he is a member of our profession and wish him long life and happiness in his retirement from official work.

THE DEVELOPMENT OF OFFICIAL CONTROL IN MEAT INSPECTION

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In comparatively recent years additional legal schemes and measures, based on hygienic requirements considered necessary, have been introduced to improve the condition of meat sold for human consumption and to protect the consumer from the grave risks of diseased or unwholesome meat. Owing to the modern advance in scientific knowledge connected with bacterial and parasitic diseases and the recognition that many animal diseases are communicable to man, the question of meat inspection has become of major importance among public health prophylactic measures.

Meat forms such a substantial proportion of the staple diet among the people of this country, that it is essential that only clean, healthy meat should be available for the public.

The following returns, extracted from the Empire Marketing Board returns for the years 1929 and 1930, show the amount of meat consumed in the United Kingdom (England, Scotland, Wales, Northern Ireland) during these years:—

	1929. Home. Tons.	Imported. Tons.	Total. Tons.
Beef and Veal	647,000	530,850	1,177,850
Mutton	239,000	282,700	521,700
Pork	243,750	471,550	715,300
	1,129,750	1,285,100	2,414,850

	1930. Home. Tons.	Imported. Tons.	Total. Tons.
Beef and Veal	613,000	599,800	1,212,800
Mutton	199,800	320,400	520,200
Pork	241,850	519,150	761,000
	1,054,650	1,439,350	2,494,000

Canned imported.	Tons.
1929	52,400
1930	64,850

This is exclusive of poultry, rabbits and game, and shows that approximately 127 lb. of meat are consumed per head per year.

The inspection of carcases intended for human food has been carried out, in varying degrees, downward from the prehistoric ages. For 500 years before the ending of the B.C. era, animals intended for sacrifice were carefully examined and only sound specimens used, the inspection of the live animal thus having a religious bearing, and the idea was handed on in connection with carcases to be used as human food. Among the Jews to this day, the slaughter and inspection of carcases intended for human food has a religious bearing. This, like many other ancient religious rites, is supported by a background of sound sanitary and hygienic reasons.

The Book of Levitical Laws contains restrictions regarding the use of animal carcases as food. These laws insist that the animal should be well bled, and, further, prohibits the use of the flesh of strangled animals.

Mohammed laid down similar restrictions in the Koran. He forbade the use of animals which died a natural death, carrion, blood, pork. We recognise that well-bled meat has a higher keeping quality and is more wholesome than badly bled meat.

From the Middle Ages, Germany seems to have been, among European nations, the pioneer as regards laws controlling meat for human food, and even to-day we look upon one of their outstanding veterinarians, Robert von Ostertag, late Professor in the Veterinary High School of Berlin, as being the leading world authority on the inspection of meat for human food. The Augsburg Charter, dated 1276, contains the following:—

"No butcher shall slaughter a beef animal or sheep or calf except in a slaughterhouse. If, however, animals die in country districts, two citizens and two honest butchers shall be appointed to issue a warning so that the people shall suffer no harm from buying bad meat. If a butcher kills a measly hog he shall sell it to no one without a statement of this fact. All the parts of any such animal shall be sold in the same booth, and if it is sold whole it shall be only under declaration."

In 1370, tuberculous flesh was prohibited for sale in Munich. Eventually the law became general throughout Germany. Early in the seventeenth century all tuberculous meat was destroyed on the assumption that tuberculosis in animals was the cause of syphilis in man, but towards the end of the century the supposed relationship between these two diseases was denied and the embargo on tuberculous carcases was removed.

As early as 1587 inflation of carcases was prohibited in Germany:—

"Certain butchers and their assistants occasionally use their unhealthy breaths to inflate the meat of calves, wethers and bucks. To stop this repulsive and abominable deception and prevent all harm, masters of the guild and accredited meat inspectors shall give diligent attention to these points." (Litchenberg.)

The first scientific work on meat inspection, "Die Fleishkost des Merschen," was published by Gestach (Prussia) in 1870; about the same time Lydtin, the head of the Veterinary Department of Baden, organised a model system of practical meat inspection. Since that date the veterinary meat inspection throughout Germany has continued to expand and improve. When the author visited the public abattoirs in Berlin in 1928, he found for that city alone there was a staff of 60 veterinarians in the abattoirs, and in the laboratories an assistant staff of 80. Belgium, Denmark, Holland and Switzerland have each established well-organised systems of meat inspection, modelled on the German system, controlled and run by scientific veterinarians.

Owing to the large business in the export of meat from such countries as Australia, New Zealand, Argentine, Chile and U.S.A., there has been developed during the past half century a well-established veterinary meat inspection service in each of these countries. There is no doubt that in these exporting countries the inspection was primarily established mainly on economic grounds rather than for purely public health reasons in the interests of the natives.

By 1880 the U.S.A. had built up a high export business in American pork and bacon. Large quantities were exported to Europe, but owing to *Trichina* being found in these American pig products by Continental veterinary meat inspectors, certain countries, including Italy, France, Austria and Germany, prohibited the importation of pork and bacon from America.

In 1882 Great Britain prohibited the importation of American cattle, to prevent the introduction of contagious pleuro-pneumonia.

These measures, which so heavily hit the export trade of America, stimulated the Government of that country to establish a veterinary meat inspection service. In 1884 the Bureau of Animal Industry was established, and one branch of it controls the work carried out for the eradication of contagious diseases of animals, and meat inspection, with the result that the system of veterinary meat inspection of products for export from the U.S.A. is second to none throughout the world.

The restrictions imposed on the American pork products were removed by Germany and later by Italy, France, Denmark and Austria, the chief condition laid down by each of these countries being that any imported meat must be examined and passed by a veterinary meat inspector. Owing to the adoption of this veterinary service in the U.S.A., the large export business in pork products has been re-established.

The establishment of the veterinary meat inspection in Australia and New Zealand was introduced mainly for business reasons, to improve the export trade in meat.

The presence of the *Onchocerca*, discovered in Australian and South African meat some 20 years ago, hit the beef trade of those countries but stimulated an increase and improvement in the veterinary meat inspection service. In 1911 the Federal Commonwealth Government of Australia instituted a system of veterinary meat inspection, under central control; previous to that, inspectors were under local control.

In New Zealand a general system of meat inspection was established in 1900. Veterinary surgeons are appointed as meat inspectors, all of whom are under the sole control of the Chief Veterinary Officer of the Dominion.

The principal export business of the Argentine is of beef and, as is to be expected, a

well-established veterinary service is maintained under Government control.

All South American countries exporting meat maintain a veterinary meat inspection service. Owing to the discovery of caseous lymphadenitis in carcases of mutton exported to England from two South American countries, during the past ten years the veterinary staff employed in meat inspection in those countries has been increased, and as a result the number of cases of caseous lymphadenitis, which varied from 6 per cent. to 10 per cent., has now practically disappeared from mutton carcases *ex* Brazil and Chile.

In most civilised countries there are established well-organised meat inspection services, but in England, notwithstanding we are large consumers of meat, there is no compulsory general system of meat inspection in the country. In the past, meat inspection in this country was neglected, and, indeed, even at the present day, its importance is not adequately recognised. Meat is the most important part of our food from the point of view of nutrition, on the one hand, and the possibility of disease being transmitted, on the other hand. Were it not for the well-regulated system of veterinary inspection controlled by the Ministry of Agriculture for the eradication of scheduled contagious diseases of animals, the meat consumer in this country would be open to even greater risk than at present, in contracting diseases of animal origin.

HISTORY OF MEAT INSPECTION IN ENGLAND

Among the oldest records regarding slaughterhouses and meat inspection in this country, the statute of the Pillory and Tumbrell of 51 Henry III c. 6 (1266-1267) required that inquiry be made "if any butcher do sell contagious flesh or that had died of the murrain (or if any do buy flesh of Jews, and then sell it to Christians). Also of cooks that seethe flesh or fish with bread or water or any otherwise that is not wholesome for man's body, or after that they have kept it so long that it loses its natural wholesomeness, and then seethe it again and sell it."

Similar provisions prohibiting the purchase of flesh from Jews and the sale of flesh dead of the murrain, or the sale of swine's flesh measled are contained in a statute of Edward I (1302-3). Both these statutes were repealed by the Act of 6 and 8 Vict. c. 24. In 1338 a local law was passed in Oxford by which butchers were forbidden to slaughter animals in the town, again because several persons of note had died from the effects of the foul odours.

The Worshipful Company of Butchers in London existed as early as 1180, but were not at that time legally recognised.

During the reign of Henry VI (A.D. 1423) it was made an offence by the Mayor and Corporation of the City of London for a butcher to sell fragments of meat on Saturday that might have been kept over from the previous Thursday. In the reign of Richard III rules were made by Butchers' Guilds in various towns, a special one being connected with Oxford, in 1536, in which power was given to seize any diseased carcases slaughtered in the town. As early as 1621 inflation of calves' carcases was prohibited at Newcastle-on-Tyne.

From that date down to 1875 many enactments dealing with the sale of unwholesome food were placed on the Statute Book. Most of these were repealed by the Public Health Act of 1875. This Act contains sections dealing with unsound food, and is now in force in England and Wales, exclusive of the administrative County of London.

These Acts were further repealed by the Public Health (London) Act of 1891.

Although most of the public health legal measures were repealed by the Public Health Act of 1875, the Towns Improvement Clauses Act of 1847, which contains sections dealing with the examination and seizure of unsound meat, was not repealed. Although many sections of the Towns Improvement Clauses Act were included in the Public Health Act of 1875, a most important section, No. 131, was not included. Section 131 of the Towns Improvement Clauses Act provides that: "The Inspector of Nuisances, the Officer of Health or other officers appointed by the Commissioners for that purpose, may enter butchers' shops, lairs, and examine and seize and have condemned by a Justice any carcase or part of carcase which appears unfit for the food of man."

Sections 116 to 119 of the Public Health Act of 1875 are the statutory provision on which sanitary authorities outside the administrative County of London act in connection with the seizing of meat.

The issue by the Minister of Health of the Public Health (Meat) Regulations, 1924, was an important advance in the administration of meat inspection in this country, but in comparison with what is done in other countries we are still a long way behind them.

The Meat Regulations were designed to give effect to certain of the recommendations of the Departmental Committee on Meat Inspection. They require that where an animal is slaughtered for sale for human consumption, notice must be given to the local authority and the carcase must be retained for three hours to give the inspector an opportunity of inspecting it, if the local authority desires that to be done. The requirements as to the detention of a carcase do not apply in the case of sheep.

The Regulations further provide for the

cleanliness of stalls, shops and in transport and handling.

The issue of these Regulations proves that there are adequate reasons for inspection of meat, but unfortunately local authorities vary a great deal in the interpretation of the Regulations, and as a result the amount of inspection varies with the district. It would appear that only widespread outbreaks of anthrax, meat poisoning or other disease, arising from unwholesome meat, causing a scare among the inhabitants, will arouse the public to the necessity of taking adequate public health measures to prevent the ill effects of bad meat.

Every district in the country, rural or otherwise, should have an organised and compulsory system of meat inspection. In other respects England is well organised as regards public health measures, but in regard to meat inspection there is a great lack of uniformity, more particularly as regards the number of inspectors employed and the number of carcases examined in each district. The development of general meat inspection in this country has been too long delayed. The development has been hampered to a large extent owing to the absence of public slaughterhouses. At the present day the public slaughterhouses in England are few and far between, and even in most of those places where public slaughterhouses have been erected, there is no law that the public abattoir shall be used to the exclusion of all others in the district, and for this reason private slaughterhouses continue to be used throughout the country.

From the above we see that many countries have established a compulsory system of general meat inspection. These include Australia, New Zealand, Canada, United States of America, France, Germany, Belgium, Holland, Denmark, Norway, Sweden, Spain, Italy, Switzerland, and for exporting meat, Brazil, Argentine, Chile. The standard of meat inspection in those countries is of a high character and this, to a large extent, is due to the restrictions imposed by the importing countries, such as Great Britain. All of these countries maintain an adequate veterinary staff for meat inspection. It is a curious position that the Government Department of Great Britain which demands such a high standard in imported meats should lag so far behind other countries in inspection of the home-produced article.

Meat inspection is neglected in many parts of England. We can never hope to have a true uniform meat inspection in this country until it is all controlled by veterinary surgeons and thus ensure increasing the healthy food supply of the people.

The taxpayer, indeed the whole nation that pays for him, is entitled to the best guardian of the people's most important food (meat and milk). Inspection of such food, which, as previously stated, is both so valuable on account of its nutritive qualities and so dangerous on account of its disease-bearing possibilities, should be under the control of properly trained inspectors—the veterinary surgeon who specialises in such work.

Such a system of inspection should be organised in Great Britain. There is a vast amount of work awaiting the pioneer who will raise our standard of inspection of the home-produced meat to the level we insist on in the imported meat. It is said there is not a sufficient number of specialised veterinary surgeons to meet the demand. If the system is established, the demand will soon be met. It is the duty of the State to assist in the education of veterinary inspectors by subsidising the veterinary teaching establishments. It is the duty of local authorities to provide the best form of inspection; indeed, no progressive municipality, county borough or county council, that wishes to develop a public abattoir in its district, could hope to produce sound meat without the assistance of the veterinary inspector.

If England comes in line with other countries, we may then look forward to setting up an international uniform standard of meat inspection.

Functions of the Meat Inspector.

The meat inspector is employed by the local authority to pass judgment on the fitness or otherwise of meat for human consumption. The inspector need not pass judgment as to its nutritive qualities. It is for him to determine if the meat is free from disease and wholesome. The responsibility of the meat inspector is no light one when it is realised that meat which, to the untrained naked eye, is apparently good, may be capable of causing severe illness or even death to the consumer, *e.g.*, ptomaine poisoning or anthrax.

It is a well-established fact that in those centres in which there is maintained a regular veterinary staff employed on meat inspection, the number of animals and portions of animals found diseased and unfit for human consumption forms a large percentage as compared with the amount found in those centres in which regular veterinary meat inspectors are not employed. Consequently, the populace in those centres in which inspection is of a low standard or non-existent run greater dangers from diseased meat.

Inspection.

In well-organised centres where animals are marketed and slaughtered, provision is made for the veterinary examination of animals for the prevention and the spread of contagious diseases. This work can be carried out hand in hand with the meat inspection by the

same veterinary staff. The Departmental Committee on Meat Inspection in paragraph 22 of their report say: "The ideal staff for meat inspection work would consist of men possessing a considerable knowledge of pathology, both human and animal."

The committee recommended that the veterinary officers in the larger towns should be given the duties of expert meat inspectors, and in the rural and smaller urban districts they consider it would be advantageous to utilise the services of the county veterinary officer in that capacity.

The amount of imported meat used in this country forms such a high percentage of the total that it is necessary that special attention should be paid to the inspection of such meat. Owing to the inspection after arrival at certain ports in this country, several diseases were detected in meat, and this stimulated well-organised, efficient meat inspection in the countries of origin, but during recent years great changes have taken place in the imported meat industry. Owing to foot-and-mouth disease having been discovered in imported carcases in this country, the Ministry of Agriculture have issued an order, Importation of Carcases (Prohibition) Order of 1926, which provides that no fresh carcases, hides or skins may be imported from any country on the Continent of Europe, other than Ireland, the Channel Islands, or the Isle of Man, and as a large amount was previously imported from Holland, Denmark and Germany, this order caused a modification in the trade and only cured carcases, principally bacon, are now imported from those countries.

The population of the United Kingdom has increased so much in the past 30 years, without a corresponding increase in the cattle and sheep population, that we are more dependent on imported meat supplies, and for this reason it is fortunate for us that there is such a well-established veterinary meat inspection in the countries of origin of the meat sent here.

The most recent regulations in connection with imported meat are the orders made under the Merchandise Marks Act, in which it is provided that bacon and ham shall be stamped, showing the indication of origin, and draft regulations are now in existence for similar conditions to apply to beef, mutton and pork.

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Sir Hilton Young, Minister of Health, will open the Dr. Stenhouse Williams memorial library at the National Institute for Research in Dairying, Reading, on October 13th.

NOTES ON THE HISTORY AND DEVELOPMENT OF MEAT INSPECTION IN EDINBURGH

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It was not until about the middle of the nineteenth century that clauses began to appear in local and general Acts of Parliament conferring power on local authorities to inspect meat and to seize it if found to be diseased or otherwise unsound. Then, as now, the larger and more progressive cities and towns secured the power, by special local Acts of Parliament, and prepared the way for general legislation, which usually followed in the course of a few years. At an earlier date rules and regulations were made by town councils governing matters relating to the inspection of meat and of flesh markets, to the use of slaughterhouses, where such existed, and the slaughtering of animals for human food. Officers were appointed to carry out the inspections and were empowered to make seizures. Offenders were prosecuted and punished on conviction, but, so far as the writer has had access to records, prosecutions appear to have been undertaken only in cases of a flagrant character, and had reference to seizures made on account of decomposition rather than disease. This is only in accordance with expectations, since the inspecting officers could have had little, if any, training specially directed to their duties of inspection.

At a still earlier date, when municipal government was in a primitive condition, the Incorporation of Fleshers carried out an inspection of their craft, and in their Charters or "Seals of Cause" they were definitely charged with that responsibility, and were endowed with rather drastic disciplinary powers, as will be seen from the following extract from the Fleshers' Seal of Cause dated April 11th, 1488: ". . . we deem expedient that the deacon and best of the craft daily search the craft, if any of them either buy, slay or sell any infected flesh or fish, or keep rotten, putrefied beasts which have died by themselves . . . and he who is caught with such to be deprived of his freedom, his goods to be escheat to the sick folks as alms, and he to be banished the town and the craft by the officers at their discretion for ever."

It is difficult to determine when the responsibility for inspection was undertaken by the town council, but at least as early as the middle of the seventeenth century officers were appointed for the purpose by the council. The appointments appear to have been made each year. After the annual elections a bailie was selected to supervise each of the markets, and the bailie appointed inspectors to act under his

directions. The fleshers, however, continued to exercise some degree of supervision over the craft long after their punitive powers appear to have been lost. Evidence of this is to be found in the petitions which, from time to time, they laid before the town council pleading for amendment of the regulations or the making of new ones to check or prevent abuses, specific instances of which were quoted in support of their pleas.

Bull beef appears to have been regarded with considerable prejudice in earlier days, since the regulations (1805) prohibited its sale unless marked as such with letters at least three inches in length on a board, and it was forbidden to be sold along with other meat. "Blowing, brading, scoring or nicking" were also prohibited. In both cases the penalty was confiscation of the meat and a fine. Both of these prohibitions were incorporated in a local Act of Parliament about the year 1850—that with respect to blowing is still in force, that relating to the marking of bull beef was repealed only as recently as last year, but no attempt had been made to enforce it for many years previously.

Until about 1740-50, the fleshers in the city slaughtered and dressed their animals somewhat indiscriminately in public places. Closes and vennels opening off the streets were convenient places for the purpose, but it was quite a common practice to use the street in front of the fleshers' own premises, blood and refuse being simply left where it lay after the work was completed. About the date mentioned, the Town Council determined to remedy this state of affairs, and they initiated measures which had the effect of compelling the fleshers to use the shambles or slaughterhouse which had then been established on the south bank of the Nor Loch. This old slaughterhouse served its purpose for about 100 years, when the site, together with adjoining ground, was sold to the Edinburgh and Bathgate Railway Company, who built on it the nucleus of the Waverley Station of to-day. In any case, its day was past. It was situated on the low level, a little to the west of the North Bridge which had then been built, and it was exposed to the view of those who, passing over the bridge, cared to look over the parapet to the west. And the citizens had petitioned the Town Council praying for its removal to a less conspicuous site.

In 1850 the Town Council were granted power by means of a local Act of Parliament to erect a new slaughterhouse, which was built in Fountainbridge and opened a few years later. The Act included a provision prohibiting the slaughter of animals for human food, within the city or within one mile (later extended to two miles) of the city boundary, elsewhere than in the public slaughterhouse. As a further precaution against evasion of the use of the slaughterhouse, the Town Council were authorised to charge and collect dues which are referred to now as evasion dues. These dues were levied in respect of all carcases brought into the city and they are of the same amount as would be paid for the use of the slaughterhouse in respect of an animal of the same kind. Similar powers were incorporated in the Act of 1905 in terms of which the present slaughterhouse at Gorgie was built and opened about 1910. The evasion dues are payable equally in respect of home and imported meat and they make a contribution towards the costs of management and maintenance of the slaughterhouse which is far from negligible.

In the Police and Improvement (Scotland) Act, 1862, similar powers were granted to all burghs in Scotland, to erect public abattoirs, thereafter to close all private slaughterhouses (without compensation), and to charge evasion dues. To this Act we are indebted for the fact that, with six or seven exceptions, every burgh in Scotland, even those having a population of less than one thousand, possesses a public slaughterhouse to the exclusion of private establishments. In turn, it is to the concentration of slaughtering in public abattoirs in the burghs that Scotland owes the progress which has been made towards uniformity and a higher standard of meat inspection during recent years.

It would serve no useful purpose to enter into details of the provisions to be found in the older Acts of Parliament relating to meat inspection. It is sufficient to say that, at least from 1850 onwards, local and general Acts of Parliament contained provisions conferring the power to search for, to seize and to condemn diseased and unsound meat and to impose penalties by way of fine or imprisonment. But, until the Public Health (Scotland) Act, 1897, was placed on the statute book, the qualifications to be possessed by those charged with carrying out these duties were not specified. Sometimes it was provided that the meat was to be judged unsound by two competent persons before it could be seized, without indication of who was to be the judge or what was to be the standard of competency. At others it was simply the person or officer appointed for the purpose by the Town Council who seized meat and then sought a magistrate's warrant for its destruction. Under the Act of 1897, the power to search for and to seize unsound meat was restricted to the medical officer of health, the sanitary inspector, or a veterinary surgeon, approved for the purpose of this Section of the Act by the local authority. In certain respects still further limitations were imposed by the Public Health (Meat Inspection) Regulations (Scotland), which were first promulgated in 1923, in terms of which every local authority in Scotland was

called upon to appoint a meat inspector on whom devolved responsibility for carrying out the Regulations under the directions of the local authority. Persons competent to act as meat inspectors were defined in the Regulations as the medical officer of health or the veterinary surgeon approved in terms of the Act of 1897, or a sanitary inspector who, at the time of the issue of the Regulations, had already been engaged for a period of not less than seven years in the work of meat inspection.

The Public Health (Meat Inspection) Regulations (Scotland), 1923, were the result of a report of a Departmental Committee on Meat Inspection, appointed by the Scottish Board of Health, which was issued in 1922, the recommendations of the committee being adopted for the purposes of the Regulations. For the first time in Great Britain, the Regulations prescribed the procedure to be followed in the routine inspection of the carcases and viscera of animals slaughtered for human food. They also laid down standards for the judgment of carcases, and defined the diseased conditions under which total or partial seizures must follow. They have not made the seizure or passing of a carcase a matter of routine, the need for personal judgment, consideration and care remains, but they have greatly strengthened the position of the meat inspector in his work, inasmuch as they have established, by law, the conditions under which partial or total seizures shall be made.

In this respect Scotland is in a materially stronger position than her neighbour south of the border. A Departmental Committee of the Ministry of Health, on Meat Inspection, which also reported in 1922, adopted, for the purposes of their report, the recommendations of the Scottish Departmental Committee on methods of inspection and standards of judgment. These were later issued by the Ministry as recommendations in the document known as Memo. 62, Foods. In a contested seizure or prosecution, a court would rightly attach great importance to the recommendations contained in this Memo., but they are only recommendations and do not represent the law on the subject, as do the Scottish Regulations.

The Scottish Regulations would not have been a practical working proposition, capable of being enforced, if a multiplicity of private slaughterhouses had co-existed with public abattoirs in the Scottish burghs, as they do in the English towns and cities. As already mentioned, it was the compulsory use of the public abattoirs provided by local authorities in Scotland, to the exclusion of private slaughterhouses for many years, which determined the practicability of issuing the Regulations and permitted this step forward to be taken.

The possession of powers to prevent traffic in unsound meat, and its exposure for sale, is no deterrent unless adequate measures are taken to make those powers effective. It is of interest to look back for a period of time to see how far the powers relating to meat inspection, which had been granted to the city by Parliament, were exercised and to what extent they were effective in controlling the sale of doubtful or diseased meat. Records are to be found in the minutes of the Town Council of the City of Edinburgh, which show that a trade in unsound meat was extensively and sometimes flagrantly carried on under the eyes of the authorities. There is no doubt that conditions within the city were only a reflection of what was happening elsewhere in Scotland, especially in and near the larger centres of population, at the corresponding periods.

In illustration of the conditions which prevailed at various times and of the apparent futility of the methods of inspection and control, a few extracts have been made from the minutes of the Town Council, which appear to be of sufficient interest to be worth quoting.

On July 1st, 1796, the Town Council gave consideration to a petition of the Deacon of the Incorporation of Fleshers, which showed that "there had prevailed a practice of exposing salted beef in the upper market, not only at unseasonable hours, but often the meat so exposed was in a state unfit for use. On April 23rd, some persons exposed a quantity of salted beef after daylight, which, when examined, was found so extremely bad as to be absolutely unfit for human use, was ordered out of the market and buried in a dunghill at the Charity Workhouse. Another quantity of salted beef was similarly condemned on the same day." The petitioner pleaded that such meat should be examined by the person appointed by the Council to inspect the markets and that a fine should be imposed on all persons exposing such meat in an improper or unwholesome condition. This extract would appear to indicate that, at the date in question, the Incorporation of Fleshers still carried out an inspection of the craft, but that they had lost the punitive powers which they previously possessed. It also indicates that their method of inspection was more effective than that of the person appointed by the Council to inspect the markets.

In August, 1856, the Market Committee reported on a remit to enquire into the removal of the carcase of a diseased cow from the slaughterhouse with, it was alleged, the knowledge and connivance of the superintendent. It was held to be proved that the owner had cut the throat of a cow belonging to him, had conveyed the carcase to the slaughterhouse, where it was dressed in the common booth in the sight of the superintendent, who told the owner that he might sell the flesh provided disease was not

discovered when it was cut up. At this enquiry Professor Wm. Dick gave evidence that "the animal had died of dropsy and that disease in the carcase was quite perceptible and ought to have been easily discovered without cutting the flesh." The committee reported that the conduct of the superintendent was reprehensible and that he be reprimanded accordingly. Apparently at that date it was quite an easy matter to use the public abattoir for the purpose of dressing the carcase of a dead or diseased animal and to remove the carcase for sale to the public. The public were fortunate if the inspector of markets happened to detect it after removal and intervened for their protection. In conversation with some of the older butchers in the city, men who are still in business, the writer has heard lurid tales of the flagrant use of the public abattoir for disguising and removing evidence of disease in the carcases of animals slaughtered therein, and of the removal and sale of such carcases with a freedom which, under present-day conditions, appears almost inconceivable. Even if one discounts these tales to the extent of at least 50 per cent., it is clear that, until the late years of the nineteenth century, an extensive trade in the carcases of dead and diseased animals was carried on openly in a manner which, in the light of modern conditions, is difficult to visualise.

As bearing on the above, the Town Council in June, 1857, considered a representation by the Superintendent of Police to the effect that "parties, after the animals have died or have been killed in consequence of disease, dress and prepare them for sale, and carry the dressed carcases to Edinburgh and retail the diseased meat within the city." The Lord Provost's Committee reported that they had amended the Regulations . . . . giving the inspector power to keep a watch over suspected or previously convicted persons, to examine meat coming to or going from Edinburgh, to find out places beyond the bounds of police where animals are slaughtered and dressed to be brought into the city, the roads and times by and at which they come, and to watch for and examine such carcases. The inspector was also to visit the cow byres within the police bounds and take special note of any cow affected by disease, and to keep a special watch to detect if any attempt was made to sell the animal or to kill it and dress the carcase.

These powers, if exercised, appear to have had little, if any, effect in checking the trade in diseased meat, which continued to flourish for many years. Professor Walley, then Principal of the Royal (Dick) Veterinary College, became associated officially with the Edinburgh abattoirs about 1874, but it would appear that he acted only in an advisory capacity when called upon, and that he had no responsibility for the administration and organisation of the work of meat inspection. He was, without doubt, one of the pioneers in the application of scientific knowledge in the inspection of meat in this country. In 1890 he published a "Practical Guide to Meat Inspection," in the opening pages of which he draws a somewhat lurid picture of the state of affairs then existing in the traffic in unsound meat. After stating that these conditions were due "largely to indifference and to apathy on the part of those who are supposed to be the guardians of the public health," he makes the following remarks about the trade and those engaged in it:—

"The business of the 'carrion butcher,' like that of the 'horse-coper,' can only be conducted by men possessed of a large share of cunning, and of a profound belief in the gullibility of a large proportion of their fellow-men.

"For originality and fertility of resource in fighting against constituted authority, and in devising means for carrying on his nefarious traffic; for the instantaneous coining and uttering of unblushing falsehoods; and for the absolute indifference with which he contemplates the injury likely to be inflicted on his victims, the 'carrion-butcher' is only equalled, certainly not surpassed, by the horse-coper, and as in the case of the latter, the cast of his mind makes his work a congenial task. Like Ishmael, his hand is against every man, and he runs the blockade with as much daring and with more cunning than ever was shown by the captain of a confederate schooner.

"A few trusses of hay or bundles of straw, a few useless but innocent-looking articles of furniture, serve to hide from the eye of the watchful constable or inspector a sub-stratum of contraband flesh. In some out of the way corner, in a retired part of the country, perhaps in the hollow of a hill, or the gloomy recesses of a ravine, the horse or the ox is slaughtered by night and its carcase dressed with commendable celerity, and quietly conveyed into the town or city in the early morning, where it is quickly subjected to the mincing and spicing process, or converted into potted-head, saveloy or polony, in some quiet out of the way vault or cellar. The flesh of the unborn calf—the 'Staggering Bob' of some Scottish, or the 'calf that never heard the nine o'clock bell ring' of some English town—serves admirably, with the aid of parings of ham from the pork shop, and a few pigs' or sheep's tongues, for the manufacture of potted ham—chicken—and veal. The muscles of the horse (the 'powed ox' of the Edinburgh 'carrion' butcher) give, with the aid of a little saltpetre, a rich florid colour to the tempting saveloy. The blood of the horse, and sometimes the small intestines of the same animal, are convenient and cheap substitutes for the blood and intestines of the pig in the manu-

facture of 'black pudding.' As in the case of rancid or mouldy butter—so with returned or rejected (perhaps putrid) polonies or saveloys—a little manipulation and purification by heat or chemicals quickly convert them into a fresh-looking and apparently wholesome article of consumption, which, as it is sold at a low price, is quickly purchased by a needy and indiscriminating public.

"The pictures here presented are drawn from actual experience. I have been present at the seizure of hundredweights of 'returned' polonies, and of salted (pickled) flesh, in a state of semi-putrefaction. I have assisted in the seizure and condemnation of large quantities of sapid horse-flesh, which had undergone the process of 'boning'; and of an *olla podrida* of every imaginable organ and tissue of various animals, simmered out of the semblance of recognition in a copper snugly built in the recess of a wall in an underground cellar—which also served as a sleeping apartment for the operator—and over the floor of which a miscellaneous collection of stinking stockings and underclothes, with dirty bed-linen, was strewn, and access to which was only gained by means of a cleverly contrived trap in the shop floor; and I have watched the youth of the lower strata of the population of a large town waiting in expectation at the knacker's yard with innocent-looking tin cans for the blood and entrails of the to-be-slaughtered horse.

"The traffic in diseased meat is pregnant with serious consequences other than that of direct harm to the consumers; it is one, and the most important, of the means by which the owners of animals are enabled to dispose surreptitiously of their diseased stock, and if the trade of the 'blockade runner' were suppressed the temptation to hide the existence of disease would be reduced to a minimum."

Bovine pleuro-pneumonia was widely prevalent in the city and neighbourhood at the time when Professor Walley wrote and the carrion-butcher suffered from no dearth of material with which to carry on his trade. Until quite recently there were men, living in the city, whose main occupation at that time appeared to have been the handling of the carcases of animals dying or actually dead of disease, who would describe in detail, and often with pride, the methods which they adopted to escape detection, and talk of their relative immunity against discovery and prosecution. Expenses were small, profits were large and the risk of detection was comparatively slight, so that it is not surprising that some, at least, of the apparently reputable butchers failed to resist the temptation of an occasional gamble in a trade which left large, if questionable, gains. It was the scandal of a very gross case of this kind which brought matters to a climax and led to the initiation of measures which, in the course of a few years, reduced this trade to almost negligible proportions, and finally suppressed it.

In view of the profound impression created in the minds of the citizens and of those engaged in the meat trade, by the case referred to, its details may be briefly summarised. The butcher concerned, who was also the occupier of a farm about ten miles outside the city, included in his clientéle a large number of West-End families and supplied meat to many of the best hotels and institutions. His business was regarded as one of the largest, best and most reputable in the city. On visiting his farm a few days before Christmas, 1891, he was informed by his manager of the death of a bullock, the carcase of which had been dressed by one of the farm servants. The manager stated that, from what he had seen of the viscera, he believed the bullock to have died of anthrax. This notwithstanding, orders were given to send the carcase to the city so that it would reach the shop early on Christmas morning. It was duly delivered to the shop, arriving in the city beneath an innocent-looking load of straw, and was sold the same day. (At the date in question all business premises in the city were open on Christmas Day as on any ordinary day.) The facts came to light through the death, from anthrax, of the farm servant who dressed the carcase. Prosecutions followed in the county for failure to notify, and in the city for selling the meat, the maximum penalty of £20 being imposed in each case after a plea of guilty had been tendered.

Commenting on the city case, the *Scotsman* of January 25th, 1892, states, in a leading article: "Edinburgh has lately been attaining unenviable notoriety as a receptacle for, and centre of distribution of diseased meat. We published statistics the other day, showing that, in the course of last year, no less a quantity than 377,538 lb. of diseased meat and fish was seized or prevented from going into consumption in the city. Of this ugly total condemned by the sanitary officers, 318,925 lb. consisted of beef. The figures suggest unpleasant reflections concerning the quantity which may have eluded the inspectors, of whom there are but three, and the evil effects which its consumption may have had on the public health . . . The strong feelings of disgust and indignation stirred by this latest and most aggravated example of the traffic in diseased meat will be best employed in insisting upon such changes in the law and methods of inspection as may effectively suppress it."

A change in the personnel of the inspectorate followed on the publicity given to the case. Three months later two veterinary surgeons (Mr. John Riddoch and Mr. George A. Thompson, both of whom will be remembered

by the older graduates of the Royal [Dick] Veterinary College) were appointed to the public health staff and were charged with responsibility for the inspection of meat. Later the number was increased to five. Since then, the veterinary members of the public health staff have been held responsible to the Public Health Committee and the Town Council for the inspection of meat in the city. Simultaneously with the change of personnel, a drive was made against the illicit trade in unsound and diseased meat, under the stimulus of the Public Health Committee, now fully alive to the extent of the trade and its associated dangers. With growing knowledge of the tricks of the trade, detections were more frequent, prosecutions inevitably followed detection, and the bench contributed its share to the effort to suppress the traffic. The Public Health Act of 1897 increased the penalties from a total maximum of £20 to £50 in respect of each carcase or of each portion of a carcase which was seized and condemned. The higher penalties imposed in prosecutions under the 1897 Act quickly made the trade unprofitable and may be said to have brought about its final suppression.

Over a long period of years prosecutions in respect of seizures of meat consigned to the city have been relatively few and far between. Only occasionally do the circumstances justify prosecution. The consistent support of the bench of magistrates before whom such cases are tried, many years ago demonstrated effectually that, if a doubtful carcase was to be disposed of, the City of Edinburgh was not a very healthy place to send it. But neither farmer nor butcher need incur the risk of prosecution by the dispatch, in good faith, of a carcase which is liable to seizure but of which liability they are ignorant. The 1897 Act provides that, if a carcase be examined and certified fit for human consumption by a veterinary surgeon prior to dispatch, the consignor is absolutely protected against prosecution should opinions differ and the carcase be seized on arrival.

For many years before the Public Health (Meat) Regulations were promulgated, the system of inspection and the standards of judgment applied in the city abattoir were essentially those specified in the Regulations. The same is true of Glasgow and probably other large centres of population in Scotland. The writer, on taking office in the city, experienced some little difficulty, but no serious obstacle, in applying more meticulous methods of examination for evidence of disease than those to which the butchers had previously been accustomed. It was, however, soon realised that the more careful search provided evidence which justified the action taken, whether more or less favourable to the butcher concerned. Only on very rare occasions is the judgment passed on a carcase, or on viscera, called in question, but, in fairness to the meat traders of to-day, it must be said that it is the writer's experience that the butchers of the city do not manifest any desire to take possession in the abattoir of any meat or offal which the responsible officials cannot pass with confidence and unconditionally.

It has been said that the illicit trade in doubtful or actually diseased meat was long ago suppressed in the city. There are black sheep in every fold and it may be that there are one or two who are prepared to and do take an apparently favourable chance to handle a doubtful consignment of meat received from outside, but such cases must be very rare. In fact, with very few exceptions, all the dead meat consigned to the city from outside areas passes through the wholesale dead meat markets, where it is voluntarily submitted for inspection as soon as possible after receipt, and it is immediately withdrawn if found to be unsound from any cause whatever. In respect of the few exceptional consignments passing direct to individual butchers, requests for official inspection are invariably made and complied with. Thus, whilst Edinburgh, some 40 to 50 years ago, had, to repeat the words of the *Scotsman* already quoted, "been attaining unenviable notoriety as a receptacle for and centre of distribution of diseased meat," it may fairly be claimed that, in respect of meat inspection, it occupies to-day a healthy position comparable, at least, with that of any other large centre of population.

THE CONTROL OF THE EMERGENCY-SLAUGHTERED ANIMAL AND ITS PRODUCTS

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A birthday is the occasion for reflection, and that reflection is either retrospective or prospective, or both.

Professor Ostertag has reached the allotted span, after a distinguished life spent in service to his people, and that life of service has not only been of benefit to his own country, but has been of inestimable value throughout the world. Our wish at this time is that he may be spared many years, not only to give us the benefit of his experience, but to give that dignity and importance to his calling which such a life of service has so well merited.

My feeling, after visiting other countries, including Germany, is that meat inspection in England, apart from a few centres, cannot be said to exist. We are conscious of the grave

lack of co-ordinated statistics and lack of uniformity, not only of staffing but consequently of standard in our meat inspection, and this occasion is welcomed as it will focus attention on our weakness.

The particulars given in Ostertag's older work concerning food poisoning have suggested to me the appended notes concerning the control of the emergency-slaughtered animal and its products.

It may be that if and when meat inspection in England is put upon a proper footing, much food material which is at present condemned will be saved; it is certainly true to say that much that is now eaten will be precluded from sale.

An imperative need is that there should be much more rigid control of the emergency-slaughtered animal and its products. The statement that in certain cases of emergency slaughter there are few or no macroscopic changes and the carcase may be passed for human food, although it is highly dangerous, cannot be controverted. It is of extreme importance, therefore, that there should be an *ante-mortem* examination. It should also be made compulsory for all carcases of emergency-slaughtered animals, when submitted for inspection, to be accompanied by a certificate of a veterinary surgeon, stating the nature of the illness or accident necessitating the slaughter, and, in all cases, the veterinary practitioner should notify the health authority, when he advises slaughter, and receive a notification fee, as he already does in the case of the scheduled diseases under the Ministry of Agriculture. It should be impossible for the carcase of an animal affected with anthrax, for instance, to leave the farm premises, and I think the same should be said of septic metritis and mammitis.

The presumption in the foregoing notes is that the animal or carcase is taken to a slaughterhouse or abattoir for dressing and *post-mortem* examination, but what of those animals which go to the knackeryard? What control is there over the meat and other products of the carcase there? I am afraid very little. These institutions, for the most part, are situated in isolated places and are not subjected to close inspection. We do know of cases where carcases of animals consigned to knackeryards have found their way to meat markets, and we have heard of udders and intestines also finding their way into food-preparing premises from very doubtful sources.

The only solution of the difficulty is the public control of the knackeryard.

Private slaughterhouses are giving way to public abattoirs, and the knackeryards, many of which are grossly insanitary, will have to follow suit.

Intimately associated also with the problem of the emergency-slaughtered animal is the growth of the trade of travelling or hawking butchers. There is no doubt whatever that this trade should be controlled by some system of registration, carrying with it inspection of the commodities sold.

We should be definitely against the exemption of any persons from the obligations imposed on the majority; all carcases intended for human food should be inspected, and the places where they are prepared should be licensed. It is obviously wrong, and defeating the object, to subject the members of the meat industry to rigid inspection, and at the same time allow cottagers, farmers and others to slaughter animals in premises, in many cases undesirable, to say the least, and then sell their carcases without any guarantee that they are fit for food.

In Germany, where inspection is compulsory, and, in the case of pig carcases, includes microscopical examination for the presence of Trichina, but where certain cases of slaughter for home use were exempted from inspection, it was found that all cases of Trichinosis in the human subject occurring in Berlin were due to pork products sent from outside to private persons.

If and when the public abattoir system is extended throughout the country, the special slaughterhouses set apart for the reception and dressing of emergency-slaughtered animals will give the public greater confidence, which will be increased when a general system of meat marking, together with clearing houses, has been adopted.

LIVESTOCK AND MEAT SUPPLIES FROM THE ASPECT OF THE CONNECTING LINK BETWEEN PRODUCER AND CONSUMER

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Fifty years ago there was a total of 6,000,000 cattle, 25,000,000 sheep and nearly 2,500,000 pigs within Great Britain, from which the population obtained its fresh meat supplies. The livestock within the country at that time included about 425,000 cattle, 945,000 sheep and 26,400 pigs, all of which were imported into the United Kingdom from other countries at a value of approximately £10,500,000. In addition, 5,819,351 cwt. of meat, valued at £15,025,966 were imported. The amount of meat per head of the population available from home-slaughtered animals was at that period considerably in excess of the amount from the same source to-day, because of the population having increased at a much greater rate proportionately. Further, as the years passed on the imports of

livestock gradually decreased until the year 1914, when they practically ceased, and the number imported to-day is insignificant from the practical standpoint. With the disappearance of the imported livestock, there disappeared raw materials—such as hides, horns and other products, including manure for the land—and, incidentally, a considerable amount of national wealth created by the various associated industries. To take the place of imported animals, the entry of which was prohibited—and rightly so, on account of disease in certain of the exporting countries—the imports of meat gradually increased to fill up the gap between the supply of home production and demand. Moreover, our home herds have also increased, but not as rapidly as one would have desired, particularly during the period ending about 20 years ago. To produce more livestock within the country means the production of more meat and fresh milk for the people and more manure or food for the land. More livestock and manure means better land cultivation and more corn crops and other food for the people; and the production of more livestock and food for both animal and human consumption means considerably more employment on the land and elsewhere. It naturally follows that with a greater number of animals produced there becomes available for slaughter a larger number of animals from which may be derived raw material for manufacturing purposes in almost every conceivable direction, including products utilised in medicine and surgery. The rise or fall, having regard to the demand, in the production of livestock determines to a considerable extent the condition of prosperity within the country generally; and it is in this direction that the connecting link between producer and consumer should at periods be carefully examined as to its strength in holding together the best interests of the entire community.

When considering the question of the production and feeding of livestock within Great Britain, and the available meat supplies therefrom, in relation to the consuming population, it is necessary, for the purpose of securing a better appreciation of the extent to which an ever-increasing population is likely by its demands to act as an incentive to at least the maintenance of production, if not its increase, to take into account the annual imports from over the seas besides comparing the quantities—home-produced and imports—separately or combined, proportionate to the population, at periods over a number of years. Having regard to the acreage of the country and the population numerically, it will be apparent that to keep the meat supplies adequate to meet the reasonable requirements of all concerned, a certain proportion of imports will always be necessary; but in the event of the imports so increasing as unreasonably to overflow the market, the result might well be the undoing of agriculture and the infliction of injury upon the prosperity of the country generally. For convenience, the changes occurring during the past 40 years, over periods of 20 years, may be considered.

In the year 1893, when the population in Great Britain was 33,756,000, there were 6,700,676 cattle, 27,280,334 sheep and 2,113,530 pigs within the country. From these animals it is estimated that the available meat supply was approximately 71 lb. per head of the population. During the same year, besides 340,045 cattle, 62,682 sheep and 138 pigs, 9,304,664 cwt. of beef, mutton, pork, bacon, hams, etc., were imported from over the seas, the latter being equivalent to 30·8 lb. per head, thus making the total (home-produced and imported) available meat supply equivalent to 101 lb. per head of the population per annum.

In the year 1913, the population, having increased by 23·2 per cent. during the preceding 20 years, reached approximately 41,597,000. In the same year there were 6,963,854 cattle, 23,931,412 sheep and 2,233,855 pigs within the country, from which the available meat supply indicated an increase of only ·33 per cent. during the same 20 years period. In 1913, then, owing to the much greater increase, proportionately, of the population, the amount of meat available from our livestock had been reduced to 58 lb. per head. Again, whilst the imports of livestock in 1913 were only 14,743 cattle and 501 sheep, the imports of beef, mutton, pork, bacon, hams, etc., amounted to 22,752,652 cwt., or an increase by 144·5 per cent. The amount of meat imported was now equivalent to 61 lb. per head, or rather more than twice the amount per head as compared with the amount 20 years earlier. In 1913, therefore, the total amount of meat (home-produced and imported) available was 119 lb. per head as compared with 101 lb. per head in 1893. As the population at the end of 1932 was approximately 44,992,000, that is to say, had increased during the previous 19 years by 8·1 per cent., it is interesting to note to what extent the home-produced and imported meat supplies further increased to meet the increased demand.

In 1932 there were 7,591,278 cattle, 26,411,842 sheep and 3,349,833 pigs; in other words, the total number of cattle within the country in 1932 was the largest on record, the total number of sheep was the largest for any year during the previous 21 years, and, with the exception of 1924, the total number of pigs was the highest on record. As a result of this increase, the available meat supply from our home herds showed an increase by 10·8 per cent. as compared with the available supply in 1913, thus amounting to an equivalent of 59 lb. per head of the population.

In 1932, although only about 16,100 cattle

were imported, the imports of beef, mutton, pork, bacon, hams, etc., amounted to 32,682,000 cwt., or an increase by 43·6 per cent. as compared with the imports of the same classes of meat in 1913. In 1932, then, the meat imports had increased to the equivalent of 81·3 lb. per head of the population. It will be observed, therefore, that the total amount of meat (home-produced and imported) available in 1932 was equivalent to 140 lb. per head as compared with 119 lb. in 1913 and 101 lb. in 1893. It should also be noted that whilst the herds and flocks within Great Britain—so far as an available fresh meat supply is concerned—have during the past 20 years increased within reasonable limits proportionately to the requirements of the increasing population, the proportion of imported meat within the total supply has, on the other hand, shown a considerably greater increase.

From the particulars already given, it may be stated that in 1893, of the total available meat supplies, 66·36 per cent. was home-produced and 33·64 per cent. imported; in 1913, 48·74 per cent. was home-produced and 51·26 per cent. imported, whereas in 1932 approximately 42·15 per cent. of the total was home-produced, the remaining 57·85 per cent. being imported. The value of the meat imported during the year 1932 was £77,867,000. Of this amount approximately £60,750,000 was spent in the Argentine, Denmark, Netherlands, U.S.A., etc., the remaining £17,100,000 being for supplies from Australia, Canada and New Zealand.

From the foregoing remarks it will be observed that in 1932 the amount spent by this country for meat imported from over the seas was £52,337,000 greater than the cost of live-stock and meat imported 50 years ago. It would appear highly essential, therefore, in the best interests of the entire community, that nothing should be permitted likely further to reduce the production of livestock necessary for the purposes of our fresh meat and milk supplies; but what proportion of the £77,867,000 now spent annually in other countries for imported meat should in future be spent in Great Britain instead, and perhaps prove the strongest of all connecting links by stimulating increased production, creating better markets, better farming and greater prosperity generally, is a problem the solution of which naturally remains, more or less, a responsibility of those charged with the direction of national affairs.

MEAT INSPECTION IN BACON FACTORIES

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Under the Public Health (Meat) Regulations of 1924 the responsibility for the inspection of meat throughout England and Wales rests upon local authorities, and an authority in whose area a bacon factory is situated must establish a system of meat inspection therein.

Small Factories.—In the smaller factories the inspection is usually in the hands of the officers of the local Public Health Department, the medical officer of health or sanitary inspector, whilst occasionally a local veterinary surgeon is allowed to do the work on a part-time basis. In such factories the inspection generally consists of a daily visit by the responsible officer, the examination of diseased carcases and offal, with the issuing of the usual certificates for any meat condemned as being unfit for human food. Since the pigs' marketing scheme has been in operation the inspector may also be called upon to certify weekly as to the amount of meat condemned and claimed for from the insurance company. The keeping of records of condemned meat and the various diseases met with is not regarded as of very great importance by the medical or sanitary officer, and their methods of inspection differ greatly throughout the country, neither type of official being usually capable of performing any *ante-mortem* examinations on animals, or of assisting very much in the eradication of animal diseases. As far as the lesser bacon factories are concerned, where no veterinarian is employed, the work usually resolves itself into the routine condemnation of diseased meat only.

The Larger Factories.—These are chiefly situated in the West of England and the Midlands, and the work of meat inspection is in the hands of whole-time veterinary surgeons employed specifically for this purpose under the Public Health Department of the local authority concerned, with the approval of the Ministry of Health.

The first duty of a veterinary surgeon so employed is to institute an efficient system of meat inspection and recording. The latter is of prime importance not only for insurance purposes under the pigs' marketing scheme, but also for determining the relative importance of the diseases affecting pigs and so assisting in their eradication. As a rule, in factories with a killing capacity of about 300 or 400 pigs per day, one veterinary officer, with the collaboration of the factory authorities, may be able to institute an efficient system of inspectioa, but in determining the numbers of veterinary surgeons required per factory, the method of killing, speed and numbers of conveyors in use must also be considered, whilst some bacon factories also kill cattle, sheep and calves to supply their retail shops, and in that case the presence of more than one veterinary officer will be required.

So far as the veterinary officers employed in

the English bacon factories are concerned, they usually receive every assistance from the factory authorities, who are keen on turning out a first-class product and on being able to advertise the fact that their products are derived from animals subjected to veterinary examination.

THE METHOD OF INSPECTION

Under the 1924 Regulations already mentioned, the responsibility for the detection of disease in the first place rests upon the butcher and not the inspector, thus the butcher becomes the "first line of defence" in meat inspection. The larger bacon factories work on the "mass production" principle first carried out and perfected by the Chicago packing houses. Conveyors are used throughout so that handling by the human hand is reduced to a minimum, and a killing speed of 200 pigs per hour is easily attained. From the time the pig is electrically stunned the carcases are continually moving along "endless-chain" conveyors until they arrive at the "hanging rooms." The old idea of the skilled craftsman doing the slaughtering and dressing of the carcase is no longer carried out in these factories, and "one man, one job" seems to be the rule—one man to drive the pigs into the stunning pens, one to stun, another to shackle the pig on to the electric hoist, another to "stick" each pig in the neck with a small dagger as it passes by, hanging head downwards from a rail, and so it goes on, each man playing his own little part and becoming an expert at that particular job, but few ever become "all-round craftsmen" in this "machine age."

(*a*) Ante-mortem Inspection.—This is most important, as it often enables ailing pigs to be detected on arrival and isolated for further observation, or slaughtered in emergency. An emergency slaughterhouse should be provided near to the arrival platforms, but sufficiently far away from the main factory buildings to avoid the possibility of the latter being included as an "infected place" should any contagious disease be discovered in newly arrived pigs. The importance of this will be apparent when it is realised that in some cases whole communities are dependent upon these factories for their livelihood, and the closing down of such a factory even for a few days is a calamity both for the immediate neighbourhood as well as for retail shops and wholesale customers clamouring for supplies all over the country.

The head pig drover is usually responsible for the unloading, sorting out and live-marking of new arrivals by road or rail. He, with his staff, is also responsible for the weeding out of "distressed" and suspected diseased pigs and their isolation pending emergency slaughter, or being otherwise disposed of as the veterinary officer may direct. As pigs arrive at all hours of the day and night it is impossible for the veterinary officers to be present as every consignment arrives, but the presence of an emergency slaughterhouse near at hand enables the "distressed" pigs to be dealt with immediately. The work of supervising the unloading is usually carried out by reliable men, as it is in the factory people's own interest to see that no confusion arises during the sorting out of the various lots of pigs. Thus by insisting upon the isolation of all "undesirable" pigs immediately they arrive, the veterinary officer will find his work facilitated and the possibility of contagious disease appearing in the main factory building reduced.

The pigs are best rested for 24 hours after arrival at the factory, before slaughter, and for this purpose lairage accommodation is available. It often happens that factories are not able to obtain sufficient supplies to enable them to do this, and the animals are slaughtered within a short time of their arrival; in such cases the inspector must expect a high percentage of bruised and damaged carcases. When pigs are rested for 24 hours, a careful watch must be kept for any symptoms of pneumonia, swine fever, and swine erysipelas, together with other diseases; especially is this necessary during the weeks preceding Christmas when large numbers of sows are bought for the sausage trade.

(*b*) Post-mortem Inspection. — Here again, owing to the mass production methods employed, it will be impossible for one man to inspect all the carcases and offal as they go through the slaughterhouse. Use must be made of "detention officers" in the persons of expert workmen. Thus one man may be employed wholly in severing pigs heads and examining the submaxillary and parotid lymph glands. Such a man becomes an expert at that particular work, and can be utilised in the inspection system.

In some factories separate chain conveyors are in use for (1) heads, (2) carcases, (3) intestines, stomachs and spleens, (4) "plucks," *i.e.*, lungs, hearts, livers. Here it will be necessary to have at least one "detention officer" per conveyor, and that again will depend upon the speed at which the conveyors work. Where such conditions apply, the *post-mortem* work is usually carried out as follows:—

(1) *Heads.*—The first operation of "dressing" after the carcase leaves the hair-scraping machine, is the severance of the head from the body. The submaxillary and parotid lymph glands are then examined, any surplus blood having been first washed off the cut surface. Should any disease be discovered, either in the glands mentioned or in the skin of the carcase (*e.g.*, swine erysipelas), a numbered label marked "For examination" is tied on the hind leg, and attached to this label are three other similar labels also numbered in the same way. One of these is torn off and tied on the affected head, another placed with intestines, stomach

and spleen on the offal inspection conveyor, whilst another is tied to the " pluck," the fourth remaining on the carcase. Thus the inspector is able to identify the offal from every suspected diseased carcase. The head conveyor is timed to meet the carcase conveyor at the weighing scales, and here the heads, after cleaning, cutting out the rings in the snout cartilage, ears and eyes, are weighed with the carcase, after which all " detained " heads are placed on special racks for further examination by the veterinary officer.

(2) *Carcases.*—The labelled carcases are examined after disembowelling, and splitting the backbone, and as these operations are performed whilst the pig is still moving on the conveyor, the inspector may either examine the carcase whilst it is travelling through the slaughterhouse or after it has come to rest in the " hanging rooms." This will depend upon the speed of killing and the percentage of " detained " carcases. Carcases and heads are also numbered so that they they can easily be distinguished. In an ordinary routine examination, the glands usually examined are as follows:—

Commencing at the hind quarter, the supramammary or inguinal glands are incised, but to avoid damaging the hams and flank it is best to insert an ordinary small wooden skewer under this gland and so raise it to the surface before incising. If this is not done, a deep gash is left in the fat, which when " set " completely spoils the appearance of the flank in a side of bacon. The inspector should avoid unnecessary spoiling of this sort. The other glands examined are " surface glands," *e.g.*, the iliacs, renals, prepectorals, cervical and pharyngeal. (Note that in pigs the last-named is usually left on the neck end of the carcase, and not on the head as in cattle). The spine and kidneys are also examined, as well as the external appearance of the carcase. Where a generalised disease is suspected and there is reason for believing that the carcase may have to be condemned entirely, the following glands are also cut open and examined—the popliteals, pre-crurals and prescapular (the last-named being cut into from the inner aspect of the neck, and not through the skin).

The mere act of cutting into these glands spoils the carcase for curing purposes, so the inspector should avoid cutting them unless he intends condemning the carcase or preventing its use for curing purposes.

(3) *Intestines, Stomachs and Spleens.*—These organs are removed from the carcase after opening up the abdomen, and are placed in pans on a conveyor or " inspection table." One of the labels tied to the carcase leg is also placed with them in the case of " detained " carcases, for identification purposes. The intestines are examined for inflammatory conditions, worm parasites and tuberculosis chiefly, the mesenteric lymph glands being incised and examined. The spleens and stomachs are also examined with the intestines, all diseased material being placed in a special receptacle for condemnation.

(4) *Lungs, Hearts and Livers (" Plucks ").*—These organs are removed from the carcase together, and after washing the blood-clots away, and opening up the hearts, they are hung on conveyors and carried out of the slaughterhouse either to special racks or else immediately on to the motor delivery vans for sale in retail shops. These organs are the first to be sent out of the factory in places where retail shops are provided to take fresh offals, it is therefore essential that they should all be inspected immediately after washing. Special attention should be paid to the livers—the surfaces examined, interlobular incisions made in search of hydatid cysts, and the glands cut open. The bronchial lymph glands are examined as well as the lungs and the hearts. These " plucks," if from " detained " carcases, also carry an identification label.

RECORDING

This is most important, especially since the bacon and pig marketing schemes came into operation, with an accompanying insurance scheme whereby for a small premium all graded pigs are insured and compensation is paid for condemned meat. For this purpose a careful record is kept of all meat condemned, the weight and nature of the disease being noted. Weekly claim sheets are forwarded to the Marketing Board after they have been signed by the meat inspector, pig grader and factory representative. Apart from this scheme, one cannot over-rate the importance of properly kept records of diseases. Statistical information of this nature enables one to determine the diseases causing most losses to breeders and curers. Various methods may be adopted for recording condemned meat. For the inspector to carry a note-book about with him has many disadvantages, in that the handling of meat even with rubber gloves soon makes the paper greasy and useless. Some large factories provide a clerk whose duty it is to be present in the slaughterhouse during the killing and to note all meats condemned. The numbering of the carcases makes it easy to identify each pig.

A recording board may be fixed up at a convenient spot in the slaughterhouse; this takes the form of a large black painted board fixed on an easel. The board is marked with columns for carcases, heads, lungs, etc., together with the diseases usually found in pigs. In every square against every organ and disease a peg is provided on which rings are placed whenever an organ or part is condemned, as shown on the diagram (overleaf) representing a portion of such a board.

MEAT INSPECTION RECORD

Carcases.	Heads.	Lungs.	Hearts.	Livers.	Stomachs.	Spleens.	Kidneys.	Intestines.		Diseases.
—	—O	—	—	—	—	—	—	—	—	Tuberculosis
—	—	—O	—	—	—	—	—	—	—	Strongylosis
—	—	—O	—	—	—	—	—	—	—	Pleurisy
—	—	—O	—	—	—	—	—	—	—	Pneumonia
—	—	—	—O	—	—	—	—	—	—	Pericarditis
—	—	—	—	—	—	—	—	—	—	Endocarditis
—	—	—	—	—O	—	—	—	—	—	Hepatitis
—	—	—	—	—	—	—	—	—	—	Cirrhosis
—	—	—	—	—	—	—	—	—	—	Peritonitis
—	—	—	—	—	—	—	—	—	—	Hydatid cysts
—	—	—	—	—	—	—	—	—	—	Fascioliasis
—	—	—	—	—	—	—	—	—	—	Ascarides
—	—	—	—	—	—	—	—	—	—	Hydronephrosis
—O	—	—	—	—	—	—	—	—	—	Swine erysipelas
—	—	—	—	—	—	—	—	—	—	Swine fever
—	—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	—	
—	—	—	—	—	—	—	—	—	—	Total

The rings are counted when the killing is over, and the records entered up in a diary. From these figures weekly, monthly, and annual reports may be prepared, whilst in addition all condemned meat and offal is weighed daily, and the weight noted.

Examination for Export.—The exports will consist chiefly of cured hams, bacon, canned goods, gut casings, etc. The Health and Customs authorities of most foreign countries will not accept such goods without an accompanying certificate signed by the authorised veterinary officer, to the effect that the goods are wholesome and are derived from healthy animals. Some few countries, like the United States of America, will only accept certificates signed by the medical officer for the district concerned, although the officer in question never sees the goods, nor does he ever perform *ante-mortem* examinations on animals! For gut casings, countries such as Holland will only accept certificates signed by veterinary surgeons approved by the Ministry of Agriculture and Fisheries.

In order to be able to examine the finished product, the veterinary officer should be familiar with the manufacturing processes. Bacon and hams should be examined twice after curing: once immediately on removal from the curing cellars before "drying," and again after "drying" ("maturing" in hams), and before being sold. This inspection consists in an examination of the side or ham and noting the conformation, colour and texture of fat, mould growth, etc. The insertion of a "trier" or steel skewer into the meat determines the presence or absence of "taint" or putrefaction. The trier is withdrawn and smelt, when the characteristic odour of putrefaction is apparent if the meat has not been properly cured. This work is usually carried out by senior workmen and foremen, and is a "whole-time" occupation.

By-products.—The veterinary surgeon will often be called upon for advice regarding the prevention of spoilation of certain by-products,

and their fitness or otherwise for human food. These include sausages of various types, meat pies, cooked meats, as well as canned goods. Here again a thorough knowledge of the manufacturing processes is essential. Endocrine glands will have to be cut out and prepared for despatch under veterinary supervision, so also will the various organs sometimes used in the manufacture of medicinal products. Sterilisation against anthrax, etc., must be carried out in connection with the manufacture of bone, meat and blood meals, fertilisers, pig hair for brushes, car and furniture padding. Refrigeration plays a great part in the meat industry, and the spoiling of meat is often due to faulty methods of cooling. It behoves the veterinary officer to be familiar with all these processes, which can often only be learnt in the factory itself.

Most large factories have a chemical laboratory with a competent staff of analytical chemists, where various apparently difficult problems in connection with meat products may be solved with co-operation between chemist and veterinarian. It is by interesting himself in all the manufacturing processes which go on in such a factory that the veterinary officer becomes a welcome asset to the industry instead of remaining a mere "meat-condemning automaton."

GOLF AT EDINBURGH

Victoria Veterinary Benevolent Competitions

The third annual competition for the "Simpson" Trophy took place during the Congress Week on July 31st. The arrangements were altered this year to provide a Bogey competition which attracted an entry of 17. The Competition was played off on the Bruntsfield Golf Course, Edinburgh.

The winner of the Trophy was Mr. J. Grant, Aberdeen, who was three up on bogey. Mr. Grant retains the Trophy for one year and also received a silver medal presented by Dr. Bradley.

Mr. Edwards was the runner-up and received the silver spoon.

The Ladies Competition for the Dunkin Trophy was held on the Liberton Golf Course, Edinburgh, on the same day. The number of entries was again disappointing this year, but nevertheless the competition provided an enjoyable morning for the competitors.

The Trophy was won by Mrs. McQuaker, Stranraer.

The trophies and prizes were presented by Mrs. Nairn during the Benevolent Fund Dance. The competitions resulted in a sum of £5 10s. being collected for the Benevolent Fund.

R. Simpson, *Secretary, Golf Committee.*

Papers Presented to Congress

No. 3.—THE APPLICATION OF BIOCHEMISTRY TO VETERINARY PRACTICE AND RESEARCH*

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Biochemistry is the chemistry of life. Although this science is receiving much prominence to-day, we can see the empirical application of its principles far back in biblical history. In *Genesis* the records of the making of wine from grapes, and again in *Numbers* the reference to the manufacture of vinegar, illustrate the early application of enzymes in producing biochemical changes. Towards the end of the eighteenth century we see the commencement of biochemistry as a Science in the work of Lavoisier and Laplace, who laid the foundations of the modern principles governing dietetics. The lead given by these French scientists was taken up by the Russian, Lomonossov, and more intensively and profitably in Germany by von Liebig, who founded a chemical laboratory at Giessen, which was later transferred to Munich. The synthetic production of urea, by Wöhler in 1828, may be reckoned as one of the milestones of progress in the science of biochemistry. Until that time urea was looked upon as being peculiarly the product of the living animal. Wöhler's epoch-making discovery, however, opened up a wide avenue of speculation as to how far the chemist could imitate nature in the production of organic compounds. During the succeeding years, with the development of organic chemistry, the materialistic conception of life gradually gained credence in opposition to the vitalistic theory. This engendered a close co-operation between chemistry and physiology, the latter applying the new science towards the elucidation of many of the phenomena of life. Thus we see the gradual evolution of a special branch of the science which became known as Physiological Chemistry, the first Chair of which was established in Strasbourg in 1883. The science, therefore, was at first nourished in the arms of physiology, but, by the process of inevitability, it outgrew the care of its foster-parent and, emerging under the name of Biochemistry, continued to grow in importance along a course of its own.

Biochemistry deals with the chemical changes which are continually taking place in every living subject, whether that be plant or animal. The object of this paper is to show, by a discussion

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of general principles and by reference to specific examples, the service which biochemistry can render in the study of diseases of animals.

Every living animal possesses the ability to grow and to produce energy. In order that it may exercise these functions, it must be supplied with the necessary material. This material is food. It was early recognised that the food must be sufficient both in quality and in quantity. Three so-called proximate principles must be present, namely, carbohydrates, proteins and fats, together with inorganic salts and a sufficiency of water. More recently, the importance of vitamins has been recognised, and in the drawing up of a dietary, care must be taken to ensure that a sufficiency of these is included. This precaution is the more necessary when, in the case of herbivorous animals, these are being fed intensively on concentrates, as contrasted with natural feeding. After the food has been masticated and has passed through the stomach or stomachs of the animal, it eventually reaches the intestines. It must be realised, however, that even when the food has reached the intestines, it is still outside the animal's body, and before it can be absorbed it must undergo certain changes. These changes are effected by the process of digestion, which is carried through by the action of the enzymes. When the material has been rendered soluble and absorbable, and only then, it passes through the wall of the gut and enters into the blood or the lymph of the animal. It is the business of the biochemist to study in detail the changes which take place in the foodstuffs during digestion, and to follow the processes which occur after these products are absorbed. Some of the products of digestion enter into the constitution of the tissues of the animal, differing in amount and relative proportions in the different species. With a knowledge of what occurs in the normal animal, the biochemist is in a position to determine the abnormal, and it is his business to ascertain the cause and the means of remedying the defective condition. The study of the chemistry of the tissues was a logical sequence in the investigations which followed, and gradually we find the more academic work giving place to investigations of more direct economic importance. The knowledge of the composition of foods in terms of proteins, fats and carbohydrates is no longer sufficient when discussing the diets of domestic animals. The nature of these components and, more important still, the amount of these constituents which can be absorbed by the animal, must be known. From this has arisen the chemistry of dietetics which, although it has been applied for many years, is still far from finality. Gradually it became more and more apparent that the rôle played by the mineral constituents was of an importance equal to if not greater than that for which the organic material was responsible. The animal, as a whole, may be looked upon as an aggregation of countless millions of chemical factories, each contributing its quota to the whole. The factories are bathed in the tissue juices, and their activities are regulated largely by the concentration of the inorganic ions in the latter. The contractions of the heart, the activity of muscle, the permeability of capillaries, the formation of hæmoglobin, the building of bone and the secretion of milk, are all manifestations in which mineral metabolism plays an important part. Each and all of these is intimately bound up with the welfare of the animal, and any gross departure from the normal gives rise to symptoms of disease.

The refinements of modern science have made it possible for the chemist to demonstrate the importance of the infinitely little. This is well exemplified in the part played by copper in the animal economy. An infinitesimal amount of this metal must be present in the food of the animal in order that it may thrive. Recent work has shown that even if an animal is receiving sufficient iron in its diet, and although the iron may be absorbed and lodged in its tissues, it is unable to convert this iron into hæmoglobin unless there be present also an exceedingly small quantity of copper. This provokes the speculation whether there are not in the tissues other minerals, at present unsuspected, which are necessary for the wellbeing, if not for the very existence, of the animal.

The whole organism thus is marvellously balanced and, by the combined effects of absorption, storage and excretion, equilibrium is maintained. Any disturbance in the concentration of one constituent inevitably produces changes in others, and the degree of the disturbance will determine whether there will be any clinical manifestation.

Biochemistry then, from small beginnings, has developed into a science with many ramifications and many workers. Not only do we find those who are particularly interested in the academic study of certain branches of the subject, but we also find those who concentrate their energies on its practical application. The services of the chemist are being utilised in widely divergent professions and trades. The large scale manufacturers of dietetic products no longer employ empirical methods in the production of their ware. The various constituents are now carefully analysed, and the final product is submitted to clinical and biochemical tests before it can be considered satisfactory. The production of cheese on a commercial scale is subject to control by chemists and the brewing of beer is another illustration of applied biochemistry. During the Great War the rationing of the army, and the feeding of the civilians, were directed by the findings of the biochemist. The Royal Air Force, by the application of biophysical and biochemical methods, can determine within the compass of a room, whether or not a candidate for admission

can withstand the conditions which obtain in high altitudes. But biochemistry can also be directly applied to the investigation of animal disease, and the recognition of this fact has recently caused its adoption as an instrument in veterinary research.

As a result of the investigations of biochemists, we find well-conceived schemes for the systematic investigation of the body tissues. These vary in variety from bones to blood, from muscle to endocrine organs, and from hair to body secretions. Is any of this work of use to the veterinary practitioner, and, if so, to what extent? It may be answered that eventually all of it will be useful, but time is the factor which will determine to what degree. It cannot be denied that the findings of biochemical examinations have outrun their interpretation. A knowledge of the composition of a tissue does not carry one far, unless the function of the tissue be also understood, and the more fully function is studied, the more clearly is there demonstrated the interdependence of one tissue upon another. Perhaps most of all has the study of the biochemistry of the blood led to profitable results in so far as the practitioner is concerned. I shall therefore devote some time to the consideration of this branch of the subject.

Veterinary biochemists have been hampered in their investigation of disease by the lack of reliable data referable to the composition of the bloods of normal domestic animals. This initial difficulty is now being gradually overcome. During the last four years the Biochemical Department of the Animal Diseases Research Association has been accumulating data referable to the normal animal. The results of these analyses have been carefully recorded and collated, and the information yielded by them is being found of increasing value.

The blood has been aptly termed "the stream of life." It is the *via media* by which, through the help of the lymph, all nourishment is carried to the tissues, and by which all waste products are removed from them. On *prima facie* consideration therefore it might be assumed that a knowledge of the condition of the blood would be indicative of the condition of the fixed tissues. But further consideration will show that there are limitations to this assumption. It must be borne in mind that the blood is a *transport* system. It is constantly conveying material from one part to another, and at present the biochemist, from an examination of the blood, is able to estimate only the nature and the amount of the constituents in transport at a particular time. An example will illustrate my meaning. Calcium is present in the blood of certain species in a concentration of the order of 10 mg. per 100 c.c. of serum. Now, all the calcium in the animal has been derived from outside its body, that is, it has come from its food; also, nearly 100 per cent. of the calcium within the animal is deposited in its bones. The blood is the channel of communication between these two. The animal, moreover, is constantly excreting calcium *via* the large intestines and the kidneys. If, therefore an analysis of the blood shows that it has a diminished content of calcium, this may be due to a deficient absorption from the small intestines, an increased deposition in the bones, or an increased excretion from the body. There is nothing in the analysis of the blood *per se* to indicate which factor is the responsible one. Therefore, if a diminished blood calcium should exist, one is not justified in concluding that there is a deficiency of calcium in the animal's body as a whole. Nevertheless, when these limitations are kept in mind much profitable information may be obtained from a chemical examination of the blood. This is illustrated by the following examples.

One of the earliest problems presented to the Biochemical Department of the Animal Diseases Research Association was a condition of progressive debility which affected sheep and cattle when grazed on certain areas. Examination of the bloods from affected and non-affected animals showed that the former were deficient in hæmoglobin. The extent of the deficiency was roughly proportional to the degree of debility. The condition bore clinical resemblance to that of Nakuruitis, reported by Orr, and in conjunction with the Rowett Research Institute, controlled field experiments were devised in which the test animals were treated with minerals containing a large percentage of ferric oxide, with satisfactory results. Since the publication of these observations, numerous cases of "wasting," or "pine," have been reported to us by practitioners in widely scattered areas in Scotland and in England. In every case in which our advice has been invited, I have requested specimens of blood to be sent for examination. It was soon evident that in certain cases there were causes other than deficiency of iron responsible for the condition. By thus having the blood examined chemically, we have been able precisely to indicate to the practitioner which cases would benefit from iron therapy, and this has effected very considerable economic saving. On the other hand, practitioners have reported considerable losses occurring in stock in which no suspicion of an iron deficiency had been entertained. The empirical administration of minerals and salt licks had proved useless. Examination of the blood showed the existence of a hypoferræmia, and the administration of iron compounds was recommended; these elicited a specific curative response, and no further deaths occurred. In the course of these investigations, blood was received from several cases which eventually proved to be those of Johne's disease, and in each case a marked deficiency of hæmoglobin

was observed. Such observation is perhaps not unexpected in view of the clinical condition of the animal, but it may be worth recording.

Another illustration of the usefulness of biochemical methods in elucidating the nature of a diseased condition, and in evolving a rational method of cure, is seen in milk fever. From a study of all the available data relative to this disease, the biochemist and the clinician were enabled to evolve a working hypothesis in explanation of its obscure etiology. The hypothesis was capable of experimental test and, while it has not proved wholly correct, other workers, including the original authors, have shown that it is substantially true in that the immediate cause of the disease is represented by a calcium deficiency in the blood. They subsequently found that the curative action of mammary inflation depended upon its raising the concentration of blood calcium, and were thus able to devise a rational and specific treatment of the condition by means of the injection of suitable calcium salts. In this way, the treatment of milk fever has been restored to the hands of him to whom it properly belongs—the veterinary practitioner. A similar condition has been shown to exist in lambing sickness, and also in transit tetany of mares. As the result of this biochemical confirmation, the parenteral administration of calcium salts is employed in these conditions, and a rapid recovery can be assured.

Another condition in which the chemical examination of the blood has yielded profitable results is exemplified by the so-called lactation tetany. This disease, which is usually rapidly fatal, has been shown to be invariably accompanied by a deficiency of magnesium in the blood. Occasionally, the blood calcium may also be below normal. From the known physiological effect of magnesium, it was deduced that this deficiency could account for the symptoms, and this suggested the adoption of magnesium therapy. Experience has shown that the injection of a soluble salt of magnesium with or without the addition of a calcium compound effects a cure, and this is now the routine treatment. Reports received show that recovery may be expected in every case in which this therapeutic measure is timeously adopted.

So far, I have dealt with those conditions where an examination of the blood yielded information which led subsequently to a rational and successful method of treatment. There are, however, several diseases in which a chemical examination of the tissues, although showing characteristic changes, has so far failed to elicit the exact nature of the disease, and has failed to indicate a specific cure. This is seen particularly in grass sickness in horses. Examination of a very large number of blood specimens shows that in every acute case of this disease the condition is essentially one of anhydræmia. The dehydration has proceeded to so marked a degree, and the viscosity of the blood is so much increased, that I am convinced that this is a potent factor in causing the ultimate death of the animal, because of an inability to maintain the cerebral circulation. After examining serial specimens collected from affected animals, I am of the opinion, however, that this condition of the blood is secondary, and is not the primary cause of the disease. In view of the fact that micturition and defæcation are both arrested, the disappearance of the water from the blood called for further investigation. No œdema of the tissues occurs, but, as is well-known, the stomach in this condition is distended with fluid, and the quantity present is sufficient to account for that which has disappeared from the blood. A deficiency of sodium chloride also exists in the blood, and this can be accounted for by the increased amount of this salt present in the gastric contents. This suggested palliative treatment by the intravenous infusion of large quantities of saline solution, and whilst in some cases it proved of promise, in no case was a cure effected.

Scrapie is another condition which has been approached from a chemical standpoint, and although some interesting points have evolved, the etiology of the disease still remains unsolved. It was soon apparent from the examination of the blood that the glucose content varied within wide limits. In the earlier cases examined there was a certain degree of correlation between the blood sugar and the clinical condition of the animal. The sugar concentration was high in the primary stages, and tended to fall as the disease progressed, but throughout the course of the disease it evinced marked variation. Examination of the pancreas did not yield an explanation. This suggested that the sugar changes were secondary to some other factor, and led to a determination of the glycogen content of the liver and muscle. It was found that in those cases in which the blood sugar was low, the glycogen reserves were almost depleted. Since, however, carbohydrate disturbance was one of the most marked biochemical features, and since the pancreas, as has been said, appeared normal, one was led to an examination of the thyroid and adrenal glands. In almost every case these were found to be hypertrophied, but, although these findings constituted perhaps the most significant gross lesions yet found in this disease, their actual interpretation is still to be determined.

Enzoötic abortion in sheep is a condition of great economic importance and one which presents certain biochemical features. The disease, as it affects Scotland, is peculiarly localised in its incidence. On some farms the ewes may become affected, no matter on what part they are grazed. On others they are liable to abort only when they are herded on certain areas. An examination of the blood from some of these affected animals showed a low content of inorganic phosphorus. In view of the work of

Theiler, who showed that aphosphorosis in cattle may be accompanied by abortion, it was decided to test the effect which the feeding of phosphates exerted upon the abortion rate. Accordingly, a controlled experiment was set up in which the test sheep were given a diet rich in phosphorus. This had the desired effect of raising the phosphate content of the blood relative to the controls, but it had no effect in reducing the abortion rate. Subsequently, the administration of vitamins was tried, and the initial experiment which was set up last year produced results of promise. During the past lambing season the vitamins A, D and E, alone and in combination, have been tried on a larger scale, but the results whilst satisfactory in some areas, have proved disappointing in others. From the localisation of the incidence of this condition, there is strong presumptive evidence that it is due to a deficiency or, alternatively, to a deleterious factor in the soil and/or pasture.

In thus reviewing the results of some of the problems submitted to us, it is proper that I should refer to our failures as well as to our successes. It may be that in carrying through these investigations and in putting our findings on record we may prevent others from traversing the same paths. Alternatively, it may lead to these experiments being repeated by others with greater prospects of success. The element of doubt is a powerful stimulant, and, as Duclaux expressed it, "It is because science is sure of nothing that it is always advancing."

As biochemistry develops in its relation to veterinary practice, the question arises as to who shall fulfil the more important rôle—the laboratory worker or the general practitioner. There need be no doubt about the answer: the general practitioner will always be the dominating factor in the diagnosis and treatment of disease. But it may be said, with some degree of confidence, that the more general application of biochemical methods as aids to diagnosis will place the practice of veterinary medicine on a firmer basis, which should be no longer empirical.

I have chosen to deal with this subject in a general way rather than to particularise. I have done so because I wish to stimulate the interest of the vast body of general practitioners in the possibilities of the application of biochemical methods to their work. I have touched only on the fringe of the subject, and, indeed, there is an enormous ground yet to be explored. As already indicated, much of the time in our laboratories has been occupied in the routine examination of bloods from presumably healthy animals, with a view to gaining knowledge regarding physiological standards. By doing so, we are placed in a position to interpret the findings from pathological specimens. Much, however, has yet to be done on the chemistry of the urines of domestic animals. The knowledge to be derived from the analyses of blood and urine specimens obtained simultaneously from the same animal is of much more value than is represented by their additive value. Practical difficulties, however, deter the use of this technique as a routine procedure. The laboratory worker will be dependent largely on the co-operation of the practitioner if any progress is to be made. Their relationship, however, should be clearly defined. When help is required in diagnosis it is the work of the biochemist to make his examination and report to the practitioner in terms relative to the normal standard. It is the work of the practitioner to interpret these findings and apply them in the case of his patient. It thus becomes apparent that for profitable results the laboratory worker should be a biochemist first, with a basic knowledge of the clinical syndromes, and the practitioner should be a clinician first, with an appreciation of the possibilities of biochemistry.

I have not touched on the academic biochemical research work that is being done in the domains of veterinary science as opposed to applied biochemistry in veterinary practice. Here the science of biochemistry is being more and more intensively applied. The specialised breeding of the cow for maximum milk production has stimulated fresh work on the chemistry of the secretion of milk, and the relationship of the constituents of the diet to yield. Knowledge of the chemical factors regulating the production and control of œstrus is rapidly approaching solution; and the chemistry of immunology is now becoming recognised as an important development of the science.

In considering the achievements of applied biochemistry in recent years, one feels a measure of confidence in believing that these will be continued and extended in the future, and one is tempted to conclude with these stimulating, if somewhat optimistic, words of Thorpe: "In the not far distant future the whole subject of biochemistry, which is the chemistry of life, will form but a part of organic chemistry, and we shall be able to apply to it the means and methods which have been attended with such astounding success during the past sixty years in the treatment of the parent science. When this is the case, the causes of our bodily ills will be as clear as the structure of indigo, and their removal as easy as a test-tube reaction. The treatment of disease will be as sure and as certain as the neutralisation of ammonia by sulphuric acid."

INTRODUCTION

Dr. H. Dryerre, in introducing the subject of his paper, said that the members had been listening that morning to a very interesting paper on what one might term the bacteriological side of disease and that they now intended

to dwell a little on a totally different aspect, namely the chemical relationships that existed between the diseases of animals. One might say that the chemist was somewhat in the position of a ticket collector on a railway system, who was concerned with examining tickets, seeing their nature, and, by the collection of such evidence, assessing where the passengers came from and where they were going to. To continue the analogy a little further, the ticket collector could also point to certain disturbances in the normal transport of passengers, by a sudden accession of tickets at any particular part of the railway system, or, conversely, to a diminution of traffic by a scarcity of tickets. That was largely the position of the biochemist, who was concerned with the quantitative relationships of the different constituents of the body tissues to one another and not infrequently with the qualitative nature of what he was discerning. He need not introduce his paper at any great length because he had tried to make it quite clear that he wanted the discussion to be a free and frank expression of opinion regarding certain general points that were raised. It seemed to him that a good deal of help could be obtained in the future from a closer co-operation between the practitioner, who saw the animals and who was the responsible man, and the laboratory workers who investigated in a scientific manner the specimens which the practitioner might submit to them, in order to help the practitioner in making a diagnosis. The subject was yet in its infancy and in the veterinary world a great deal remained to be done, but he hoped that as a result of the discussion a way could be pointed out for close co-operation that would lead to profitable conclusions.

Discussion

This paper was discussed by the Experimental Pathology Section of the Congress held by the N.V.M.A. at Edinburgh, the Section meeting at the Royal (Dick) Veterinary College on the morning of Tuesday, July 31st, 1934, under the Presidency of Dr. J. Russell Greig, of Edinburgh. The discussion was opened by two members: Mr. W. Hepburn, of Aberdeen, and Dr. W. R. Wooldridge, of London.

Mr. W. Hepburn, F.R.C.V.S. (Aberdeen): I much appreciate the honour of having been asked to open the discussion on Dr. Dryerre's paper, in so far as it concerns general veterinary practice. At the outset, I would offer my congratulations to Dr. Dryerre for the very able and highly instructive paper which he has given us. He has told us that he has touched only the fringe of the subject, but the paper is so concise and free from technical phraseology that it must have been read and re-read with pleasure and understanding by every one of us.

It has offered us ample scope for deep meditation on the many and diverse problems of disease with which we meet in every-day practice—problems which are urgently in need of solution. Hitherto, we have been almost wedded to bacteriology as being the one and only science that was capable of assisting us in the investigation of animal disease. Now, with the enormous advancement of biochemistry during the last few years, we may justly express our hope and belief that this comparatively new science will come to our aid and give us the solution to a number of disease problems, the nature of which is at present obscure.

In opening this discussion, I propose to speak strictly from a practitioner's point of view, and I shall confine my remarks entirely to those diseases which I personally encounter in general practice; indeed, it would be presumption on my part to do otherwise, as Dr. Dryerre says, in effect, that the practitioner should be clinician first and all the time, but should also possess an appreciative knowledge of the possibilities and the value of biochemistry to veterinary science.

A large portion of the paper has been devoted to the discussion of the biochemistry of the blood and, as a practitioner, I agree that it is from this aspect that the greatest benefit has so far been derived. No doubt the want of reliable data as to the composition of the blood of the domestic animals in health, under all the different phases of their life, has hampered the interpretation of the changes which occur in the blood of our patients in disease, but this handicap will, no doubt, in time be overcome.

It is beyond cavil that the recent advances in regard to calcium-vitamin therapy have revolutionised our methods of treatment in many diseases with most gratifying results.

Purpura Hæmorrhagica."—I would first instance "purpura hæmorrhagica" in horses. Those of us engaged in town practice know only too well what a bugbear this disease is to us, especially since it usually occurs as a sequel to some debilitating infective process. The prognosis is always very grave, and a fatal result is, unfortunately, of only too frequent occurrence. Some time ago I decided to try the effect of calcium-vitamin therapy in controlling the hæmorrhagic and œdematous swellings which characterise the malady. I have treated now, from time to time, 15 cases by this method, and all have made good recoveries. I quite realise that this number is not sufficient upon which to form a dogmatic opinion, but the regularity with which success has, so far, attended this line of treatment justifies its more extensive practice, if only on experimental grounds.

The method I adopt is to administer an initial dose of calcium gluconate, half-an-ounce in a 5 per cent. solution or 200 c.c. of calcium dextrose 5 per cent. solution (in future, I intend using a much more concentrated solution, to

which I shall refer later), intravenously, preferably, or subcutaneously; the latter causes swelling, but no abscess formation. Simultaneously a subcutaneous injection of equine "vetostelin" is given, and this latter is repeated daily. If no amelioration of the symptoms has taken place in a few days, a second dose of calcium is given. It is highly probable that a full dose of colloidal calcium—"vetostelin"—once or twice daily, depending on the severity of the case, would answer the purpose just as well.

Up to the present this line of treatment has proved most satisfactory, the recovery being uninterrupted in every case.

Transit Tetany.—Transit tetany in Shetland ponies is another disease which has yielded to calcium therapy. I frequently have to deal with this condition in ponies—both male and female—which are shipped from the Shetland Isles. The ponies are often in rather indifferent condition at the time of embarkation, and stand the voyage very badly, so that by the time they arrive in Aberdeen they exhibit a most pitiful sight. Often they are so convulsed in the spasms of tetany as to be unfit to walk ashore, and in almost every case trismus is so pronounced that the administration of any medicament *per os* is impossible. The mortality is, or was, very high, and previous to the advent of calcium one could do very little to lessen the sufferings of the poor creatures. To-day I have no dread of handling these cases, as calcium, in conjunction with "vetostelin," given hypodermically, gives relief in a few hours' time.

Navel-ill in Foals.—This pyæmic affection still claims far too many victims in the newly-born Clydesdale foal, and during this season in many districts it, or some other inherent form of debility, has accounted for nearly 50 per cent. of foals. Treatment has been almost wholly tentative, and in the great majority of cases we must admit defeat. Some time ago a very exhaustive bacteriological investigation was made in regard to the malady, but no benefit ever accrued therefrom. I would very much like to see an attack made on the disease from the biochemical aspect. I am inclined to the view that there is some upset of the normal metabolism of the in-foal mare, brought about to a certain extent by long and continuous in-breeding, and that this abnormality or deficiency in the dam favours the development of the toxæmia in the fœtus *in utero*.

In cattle practice, calcium-vitamin therapy has made possible a great advance in the scientific treatment of many of the diseases hitherto treated more or less empirically. Much has undoubtedly yet to be done, but a very good commencement has been made.

Parturient Hæmoglobinuria.—As an instance, I would refer to parturient hæmoglobinuria in the newly-calved cow. "Red-water," as we call it in the North, is the cause of many deaths in some seasons, especially in cows not more than a week calved. As long as I can remember, veterinary surgeons regarded parturient red-water as a very serious complaint, and death was the most common termination.

Quite recently the Moredun Institute has begun an investigation, under Dr. Dryerre, with the purpose of discovering, if possible, the cause and remedy. The analysis of the blood so far shows a marked deficiency of phosphates, and hæmoglobin, in every case submitted.

This evidence, although I understand it is still limited, may give us practitioners a lead as to the line of treatment to be adopted in the future. It is quite probable that, by an addition of phosphates and iron to the diet of cows approaching calving, on farms affected by this disease, a preventive might thereby be found.

"Pine."—Dr. Dryerre refers to "pine" in young cattle, and says that in many cases a hypoferræmia was found to be the cause. In my practice, I frequently meet with young stirks suffering from a condition of debility, manifested by general stiffness, emaciation and diarrhœa. This condition does not appear to be a hypoferræmia and, except in very advanced cases, I find that the daily addition of good quality cod-liver oil and sterilised bone meal to their food is all that is necessary to restore the animals to a state of health. A similar condition, characterised by reluctance to move, debility and even acute convulsions, especially at the time of feeding, is found in young pigs. This also responds readily to the same line of treatment. In *The Veterinary Record* of February 24th, 1934, p. 220, this condition was referred to by Carlström, who found a deficiency of 4 to 6 mg. per cent. of calcium, and advised the addition to the ration of calcium in the form of chalk.

Retention of the Placenta.—This condition I find is very common amongst dairy cows, and some seasons appear to favour its production more than others. In view of its high frequency in dairy cows, in contra-distinction to its comparative rarity in breeding stock, I have been disposed to think that some deficiency factor was of importance in its causation.

It has been my experience that in milk fever cases with retained placentæ, and which had been treated by calcium, hypodermically, the membranes were much more easily detached than was usually the case. I have had quite a number of these cases now, and I am inclined to the view that the calcium does exert some favourable action on the shedding of the afterbirth. Here, I think, the biochemist might step in and endeavour to assist us. Perhaps Dr. Dryerre will give us his opinion.

Milk Fever.—Dr. Dryerre refers to the chemistry of dietetics and its influence on the whole question of maintenance, production, and general well-being of the dairy cow, and we practical

veterinarians fully recognise the immense importance and possibilities of such research.

I have a rooted conviction that milk fever and other allied affections in the cow are all the result of errors in feeding, particularly in giving an "unbalanced ration" in super-abundance, according to the requirements of each individual animal. In other words, I believe that if a correct system of dietary were introduced in every dairy herd, there would be comparatively few cases of milk fever, and the problem of the prevention of the disease would naturally solve itself.

From practical experience, the truth of this assertion has been forced on me, as since one or two herds in my practice have been put on a scientific basis of dietary during the last year or two, scarcely a single case of milk fever has occurred, whereas, in previous years, when the feed had consisted of an over-abundance of everything grown on the farm, given in the most haphazard and wasteful manner, milk fever and other allied troubles were very common.

Before concluding my remarks, I would like to make a few observations on the treatment of milk fever.

I think I am right in assuming that it is now a widely-accepted fact that in all typical milk fever cases a hypocalcæmia is the essential and immediate cause of the attack, and for this scientific achievement we are indebted to the research work of Dr. Dryerre and Dr. Greig.

I am fully aware that a considerable degree of controversy exists as to the actual cause of this deficiency, but whether it is due to excessive drain of calcium from the blood, to parathyroid dysfunction, or to the effect of ovarian hormones, does not matter a great deal to the practitioner, and the problem must be left to the ultra-scientific to wrangle over. What is infinitely of more direct importance to the practitioner and his clients is the question of how milk fever may be prevented. There is now very considerable evidence that the disease may be prevented in susceptible individual cows by an injection of calcium immediately after calving, but it would be of very great importance to learn, if possible, how the incidence of the disease could be reduced in a herd by alterations in dietary.

As to the mode of curative treatment, it is now almost five years since I first adopted the calcium treatment, introduced by Dr. Dryerre and Dr. Greig, and during this period I have treated successfully hundreds of cases. In the early days I had my disappointments, I admit, due to the want of knowledge as to the amount of calcium required, and the correct technique to be employed. The great trouble was to maintain complete solution of the calcium gluconate, for if it were administered subcutaneously with the slightest trace of precipitation, an abscess or sloughing at the site of injection was liable to occur. I was able to overcome this difficulty by always administering the solution hot, and not stronger than 5 per cent., and I found that 2 oz. of the salt was quite sufficient to effect rapid and complete cure. I am greatly indebted, however, to our President, Dr. Greig, for passing on to me the information which, I understand, he obtained from an American source, namely, that the addition of boric acid keeps the calcium in perfect solution for a long period. Dr. Greig suggests the following formula as a hypodermic injection in milk fever:—

Calcium gluconate	2 oz.
Boric acid	3 dr.
Water	11 oz.

I prepare this solution by dissolving the calcium gluconate and boric acid in about 13 oz. of boiling water, which boils down to 11 to 12 oz. Up to date I have used it in 23 cases of milk fever, injecting it subcutaneously into both sides of the neck at four different points. I have made an examination of all cows treated in this way, and find that there is not a trace of any local reaction. The small quantity now required to be administered is a great advantage on the 40-oz. solution that I used previously.

To those who have not yet tried calcium therapy in milk fever, and to those who have tried it and discarded it, I would most earnestly suggest that they give this new formula a trial, and I am sure they will not be disappointed. In my opinion, it is far more scientific than the old method of inflation of the udder, which I have discarded as obsolete. That has served its day and generation, and it ought to be kept in mind that the *modus operandi* of inflation was to exert sufficient intramammary pressure to inhibit the further transference of calcium into the acini; and to a certain degree, the full flow of milk, given previous to the inflation, never returned in a great majority of cases.

In my earlier days, the method was to inject into each quarter of the udder 4 to 5 oz. of a sterile solution of potassium iodide, or chinosol, and well do I remember the disastrous results. Certainly it was much more effective than the old whisky and chloral modes of treatment, in that the animal recovered, but, as the dairyman used to say, the cow was finished so far as the production of milk was concerned.

I maintain that we, as a professional body, ought not any longer to countenance the introduction of anything into the udder which, at the time of parturition, is physiologically engorged with blood. To adopt a procedure which is calculated to overcome this natural physiological engorgement, and to decrease the secretory activity of the gland, is entirely wrong and unscientific, especially when a more rational, and undoubtedly equally efficient method has now been discovered.

The inflation method is now largely used by

the cow-owner and by his servants; well, its use should be left to them, and when they begin to realise that the milk supply is not in the least inhibited, nor is there any risk of mastitis supervening, by the more up-to-date method, they will appreciate this very important fact and employ the practitioner to treat their cases of milk fever henceforth.

I entirely agree with Dr. Dryerre's opinion as to the relationship of the biochemist and the veterinary practitioner. That the latter will always be the dominating factor in the diagnosis and treatment of disease, is undoubted, but it should be borne in mind by practitioners that unless we are willing to apply the advanced knowledge gained through the intermediary agency of biochemical and other research, as an aid to more precise diagnosis, we shall deserve all the censure that can and will be levelled at us.

Dr. W. R. Wooldridge, M.Sc., M.R.C.V.S. (London): In his opening paper Dr. Dryerre has attempted to give us a general view of biochemistry, and with one or two of his general remarks I am tempted to join issue, but the exigencies of time and the breadth of the title chosen for discussion forbid such developments. It must be obvious to all that to deal adequately with the subject of our present discussion would require many days, and I personally think that the Provisional Committee has made a great mistake in choosing such a wide field. There are many branches of biochemistry that would well repay an hour or two's discussion before a veterinary audience, but, unfortunately, as is our custom, superficial discussion of general titles is preferred to a more detailed discussion of a limited field.

Under these circumstances, then, I consider that Dr. Dryerre has given us an able introductory review into many aspects of biochemistry as applied to veterinary medicine and I, for my part, shall follow his example of a somewhat similar superficial discussion, but confined to a single aspect of the broad field. In this contribution to the discussion I shall try to bring out the importance of the isolation, identification and synthesis of physiologically active principles, particularly those associated with disease, to the prosecution of biochemical research and subsequently its application to clinical medicine.

With this point of view in mind one cannot do better than begin with the vitamins. For many years after the idea of vitamins was promulgated, chemists and many physiologists refused to believe in the existence of these factors. This scepticism was only natural, seeing that research workers were dealing with several distinct factors and that the available methods for detecting their existence were biological and so subject to the variability of animal experimentation. Gradually, however, as the biological tests improved it became possible to make attempts to isolate the various vitamins. During the last two or three years progress has indeed been rapid and one of the vitamins has not only been isolated but has actually been synthesised. Thus vitamin C proves to be a hexuronic acid, called ascorbic acid; an organic acid possessing a chemical structure rather similar to that of a simple sugar such as glucose. Apart from the fact that this vitamin can now be prepared and sold at about three shillings a gram, two great benefits at once follow from this synthesis. Firstly, the product being pure, can be administered in small quantities to animals, and providing adequate controls are taken, its physiological properties ascertained with much greater certainty than when complex mixtures are used; and, secondly, with a knowledge of its chemical structure it is possible to form an opinion as to the changes the molecule is likely to undergo even in the animal body. Thus in the case of ascorbic acid this acid has groupings which readily undergo oxidation and reduction, and it now appears certain that the physiological activity of the vitamin depends upon these groupings, the ascorbic acid proving to be an important factor in the oxidative mechanisms of living tissues. It is, however, only one factor in the complex mechanisms of tissue oxidations, but having now obtained it pure we can link its activity with that of other known factors such as glutathione and certain enzymes.

Similarly, vitamin A, although as yet not obtained pure, has been obtained in very active concentration and, as a direct result of this isolation work, it has been revealed that not only is the vitamin itself physiologically active but that three substances, called respectively α, β and γ-carotene, of somewhat similar structure, are also capable of acting in the same way. These carotenes are yellow pigments found in plants, and it appears that the animal converts them to the vitamin, probably in its liver through the agency of a special enzyme. There is evidence to suggest that the actual growth-promoting properties of the vitamin depend upon a special chemical structure in its molecule.

The other constituent of the original fat-soluble vitamin, *viz.*, vitamin D, has actually been prepared synthetically and can now be obtained commercially as a white crystalline substance. Its final chemical constitution is still unsettled, but it is related to the sterols. One important physiological result that has been verified with the pure vitamin is that an excess of the factor is actually toxic. Previously certain workers contended that the toxicity of the crude preparations was not due to the vitamin but to some of the associated impurities.

The great help this method of attack affords to biochemical research is well illustrated in the recent advances made in the elucidation of the

nature of the "vitamin B complex." Originally this was thought to be a single entity, but it is now certain that there are at least three B vitamins, and probably more. Of these the anti-neuritic factor, vitamin B_1, although possibly not yet pure, has been obtained crystalline, and it appears that this vitamin is of importance as a constituent of the system that removes excess lactic acid from the tissues. In its absence the excess acid produced in the heart muscle may lead to bradycardia, a condition which is removed on administering the vitamin. It is probable that this factor acts as a co-enzyme to the enzyme that oxidises the lactic acid.

Vitamin B_2, the antipellagra factor, belongs to a class of pigments known as flavines. It is destroyed by light. This, again, is of importance in oxidation processes, for it appears essential to the formation in the animal body of Warburg's enzyme, an enzyme that is essential to the utilisation of molecular oxygen by most tissues. The isolation of the other B factors is still not yet realised, so I shall not discuss them here, but it is clear from my previous remarks that the separation of the pure vitamin leads to a much clearer realisation of its actual physiological action. Although there is not time to develop this subject, it is clear that the pure vitamins are bound to have many useful applications in clinical medicine.

If time were available I should have liked to deal somewhat similarly with the isolation and preparation of pure hormones, but I must restrict myself to mentioning a few of these. You all are conversant with the realisation of the physiological importance of adrenaline, the hormone of the adrenals, but many of you are probably not so conversant with the isolation of the substance, acetyl choline, from many tissues and the demonstration that this substance is liberated peripherally when the para-sympathetic nerves are stimulated. Further, the vasodilator effects of stimulation of these nerves can be stimulated by the injection of acetyl choline.

The active principle of the thyroid gland, *viz.*, thyroxine, has been both isolated and synthesised, and as a result much valuable information is being obtained by using this product synthetically in those conditions associated with hypothyroidism. The great value and importance clinically of the separation of moderately pure insulin from the pancreas is too well known to need repetition, whilst the discovery of a method of synthesis would have the double benefit of saving the lives of many dogs used in its preparation and possibly of reducing the cost of the insulin. Work is progressing rapidly with the separation of other endocrine factors, such as those of the pituitary, parathyroid and sex glands, and experiment with these comparatively pure products is slowly leading to the unravelling of the complex picture of the inter-dependence of these factors. Work on the chemical nature of the follicular hormone, œstrin, proceeding concurrently with work on the synthesis of pure carcinogenic substances, has lead to a realisation that the two groups of compounds are chemically similar; in fact, it has been shown that this structure, a tricyclic phenanthrene ring system, is common to a number of substances of physiological importance, *viz.*, the bile acids, sterols, vitamin D, the ovarian hormones, the cardiac stimulating glucosides (*e.g.*, digitoxin) and certain alkaloids such as morphine and codeine of the opium group, so developments may soon follow possibly implicating degradation products of these physiological substances under certain conditions in the causation of cancer. In any case, the synthesis of pure chemical substances that are able to produce cancer cannot fail to have important developments in this field of research.

A similar future awaits the separation and possibly the synthesis of pure antigens. Work has already progressed somewhat along these lines, and it is now possible to prepare a polysaccharide free from protein from *Bact. ærtrycke*, which preparation will immunise mice against a subsequent infection with this organism. The clinical significance in the fight against disease of the preparation of such products from pathogenic organisms with their possible subsequent synthesis, must be obvious to all, for instead of injecting animals with complex mixtures such as preparations of bacterial cells, the impurities of which may cause trouble, relatively small amounts of the pure antigen may be used. Similar observations naturally apply to the preparation of antitoxins. It is for somewhat similar reasons that the preparation of a tuberculin from synthetic media is to be encouraged, especially if this leads to the isolation of the actual active principle. If this could be attained it is probable that many of the doubtful reactions of this test would disappear.

Finally, I wish to say a few words about the recent biochemical work associated with anæmias. You are probably aware that an autoclaved yeast extract ("Marmite") has a specific curative effect in the case of tropical macrocytic anæmia, including especially the so-called "tropical pernicious anæmia of pregnancy." This factor was for a time considered to be one of the B vitamins, but a further knowledge of its properties following upon attempts to isolate it, proves it to be a quite distinct entity. The same factor can be used to cure macrocytic anæmia of coeliac disease and the anæmia of sprue, but it is not curative of the pernicious anæmia in this country. On the other hand, this latter disease is cured by the administration of relatively large quantities of liver. It has now been shown that both these active substances, that of marmite and that of liver, are inter-

related and that for the avoidance of these types of anæmia two factors are necessary. One, the extrinsic factor, is found in marmite, and the other, an intrinsic factor, is really an enzyme called hæmopoietin, found in the stomach wall. Apparently the extrinsic factor of marmite is converted by the enzyme into another substance which actually cures the anæmia. This latter substance is stored in the liver. In cases of pernicious anæmia the important fact is the lack of this enzyme and so the administering of marmite effects no cure. If, however, both marmite and a small amount of the enzyme, which can be readily prepared as a dry powder, are given together then pernicious anæmia can be cured. In this way the consumption of the comparatively large quantities of liver otherwise necessary is avoided. Thus the various anæmias are brought into one picture, a result that has followed upon a study of methods to separate the active factors in the various cases. Although these instances I have cited do not bristle with the results of the direct application of these facts to veterinary medicine, it is clear that these same methods of attack are bound to lead to important developments in veterinary spheres as they already have done in the realms of human medicine or of those of experimental research on laboratory animals.

In conclusion, I would just like to say that I agree wholeheartedly with Dr. Dryerre upon the necessity for the development of biochemical research in the sphere of veterinary medicine, and although I agree that it is essential, especially in those diseases associated with changes in the concentration of various constituents of blood, to have a thorough co-operation with the veterinary practitioner, there are nevertheless very many other branches of biochemistry that will ultimately give results of importance in therapeutics; the biochemist, however, has still a very long way to go before his results will be of direct application and value to the clinician.

Professor G. F. Boddie (Edinburgh) regretted the extremely short time that was left for discussion of the paper. Dr. Dryerre had very ably explained the position. There were perhaps some members who regretted the change of name to "Biochemistry" and the dropping of the old name of "Chemical Physiology," and perhaps to some, for a time at any rate, biochemistry was rather an awe-inspiring name. But the change was necessary. Fourteen years ago he had to take a class of chemical physiology in the University of Edinburgh. The chief thing he remembered about it was that it was taught by a man who knew nothing about chemistry and still less about physiology. Long afterwards he learned that the man was an expert in making coffee. Dr. Dryerre knew quite well to whom he referred. Fortunately that was not the end of his experience of biochemistry, or, as it was then called, chemical physiology. He came under Dr. Dryerre's wing, first as student and later as demonstrator, and sometimes used to be sorry for himself as a demonstrator because of Dr. Dryerre's enthusiasm and his persistence for detail, but he now realised that it was good for him, and he belatedly expressed his gratitude to Dr. Dryerre. He nowadays came across Dr. Dryerre a good deal, when he could summon up the energy to climb up to the top of the Dick College, where Dr. Dryerre lived most of the day. The climb was always well rewarded, because he did not know of anyone who was equal to Dr. Dryerre in willingness to assist in regard to difficulties of technique. As a former practitioner, and he thought he could still claim to be a practitioner, he was perhaps a link between biochemistry and veterinary practice, because biochemistry at the moment seemed to him to be the most interesting thing that he could, when he had the spare time, dabble in. He would not say that he went to the depth that Dr. Wooldridge went to, or ever would, but perhaps his work would not be altogether useless, despite the fact that he might be tempted to skim. Biochemistry at the moment was proving to be an extraordinarily useful link between the laboratory and therapeutics. There were perhaps two outstanding instances at the moment. One was acetylcholine and the other ephedrin. Acetylcholine had been used quite a lot in human medicine as an intestinal stimulant and there was a number of veterinary surgeons who had used acetylcholine in equine practice as a stimulant to peristalsis, and the results they claimed were very much better than any they got from any of the other three hypodermic purges—arecoline, pilocarpine and phystostigmine.

Ephedrin, which had actions resembling adrenalin, had the great merit that one could give it by mouth, and although his experience with ephedrin so far had been confined to canine practice, one had found it extremely useful in circumstances in which the hypodermic injection of adrenalin might have been of use.

There was one point that was worth raising. One hoped that biochemistry would not make a similar mistake to that made by bacteriology. There was a number of bacteriologists who had forgotten that there was such a thing as pathology and who were too much concerned with the reaction of the organism in a test tube or incubator and too little concerned with the effect of that organism on the tissues. He hoped that biochemistry would not make the mistake of being too much concerned with laboratory results and not sufficiently concerned with the animal effects. If one could draw a parallel, the fact that veterinary research institutions had kept pathology to the forefront gave one little cause for fear so far as veterinary biochemistry was concerned.

There was one question which he would like to ask Dr. Dryerre and that was whether he was satisfied that "Pine" was in truth an iron deficiency.

He rather hesitated to touch upon the milk fever question again. It was probably no secret that one had previously crossed swords with the milk fever protagonists, but he must do so, because it appeared in the paper that Dr. Dryerre shifted his ground a little bit—and he assumed that Dr. Dryerre's colleague was agreeable to that move—and it seemed to him that they had come to the position to which he himself had come; in consequence they were now more or less in agreement that milk fever was always associated with a hypocalcæmia but that the final cause was still to be discovered. For the last four years he had been working at biochemistry and one or two things had struck him quite forcibly. The most important was, perhaps, that very frequently biochemical changes followed disease and were not the cause of it. In other

words, they were something like the weather and the barometer. The weather did not care a "hoot" for the barometer, so the barometer had to follow the weather. That was perhaps best instanced in grass disease, and was very interesting and very useful for explaining a number of the clinical signs presented by that disease. One thing struck him and that was that until they knew more about biochemical findings in the blood from ordinary impactions and colics of horse practice, it would be a little difficult to assess the values of findings on grass disease and that seemed to be a position where a practitioner like himself might help Dr. Dryerre by giving him samples of blood from impactions and other types of colic. He would have liked to have spoken on other matters—urine analysis and blood ketones—but he understood that his time was now up.

Mr. H. W. Steele Bodger (Tamworth) observed that he wished to take the opportunity of withdrawing something which he had said a few years ago at a public meeting in regard to milk fever. In London, at a meeting of the Royal Society of Medicine, he had been the fly in the ointment and had expressed in no uncertain manner some doubts as to the benefit of calcium gluconate, and Dr. Greig had been good enough to suggest then that there must be some truth in his remarks, as he was a careful practitioner and his technique was perfect. That coming from Dr. Greig set him to think furiously and by altering his technique he had come to the conclusion that calcium therapy was very, very efficient, and he had no hesitation in saying that since he had altered his technique he had had almost complete success with calcium therapy. His method was to boil the contents of a 2 oz. packet of calcium gluconate in one quart of water and then filter through cotton-wool into a Lane's transfusion bag, which was supplied by Messrs. Down Bros., St. Thomas' Street, London, complete with two long needles and pressure clips. By allowing the fluid to gravitate in this manner, no thickening occurred afterwards at the sites of injection. In fact, he did not think he could lay his hands on a milk fever pump in his practice.

The other point to which he would refer, although it was not so much touched upon in Dr. Dryerre's paper, had been referred to by Dr. Dryerre the previous day in regard to lactation tetany. He wished to emphasise the use of ordinary magnesium sulphate in the treatment of that disease. It had been suggested that the better method of introducing it was intravenously. That was not his experience. In cases of lactation tetany he thought that often the very attempt to introduce a needle into the jugular vein precipitated tremendous convulsions, resulting in death before one had even administered the magnesium sulphate. He found that even in bad cases of lactation tetany 1 oz. of magnesium sulphate in 2 to 4 oz. of water, injected into the gluteal muscles, gave one most spectacular recoveries in relatively few minutes—ten minutes or so. With reference to a remark by Dr. Wooldridge in regard to pernicious anæmia, he would like to give the instance, although this was a veterinary meeting, of his caretaker who, last year, was suffering from pernicious anæmia. For twelve months he watched the caretaker gradually getting worse, in spite of liver treatment administered *per os*. Finally, the caretaker was bedridden, and the speaker could only assume that in the caretaker's advanced condition a certain mental degeneration took place, and instead of being most polite, as he had been, and most obliging and obedient, he became obstinate, and when the doctor urged him to go to hospital he point blank refused and said he would rather die as he was. Finally he got still worse and was unable to rise from his bed or speak, until one Sunday morning, with a nod, he acquiesced in his removal to hospital. On his arrival at the hospital they took his pulse every hour, to make sure that he was alive. They were unable to find blood suitable for transfusion, and they gave the caretaker an injection of Bayer's "Campolon"—he thought it was 6 c.cs. injected intramuscularly every second day. Previous to being taken to hospital the caretaker had absolutely no appetite. Everything made him vomit, and he had been kept alive with hot-house grapes and things of that kind. In a very few days after his removal to hospital he began to retain things in his stomach and his appetite gradually improved. In eight weeks he had been able to get up and go to a convalescent home. Four weeks later he came running downstairs to meet the speaker and he had now completely recovered, with the exception that at the end of each day—due, the speaker supposed, to heart lesions, he got very swollen feet and ankles, but his appetite was good. He could now do anything and suffered no inconvenience. That was due entirely to "Campolon," which he believed was a live product.

The Reply

In reply to the discussion, Dr. Dryerre stated that in a certain sense his reply was made fairly easy because the title of the paper—which title, incidentally, he did not choose—necessitated a general statement, and he had only to deal in a general way in replying, with the exception of particular questions which had been put and which he would try to answer. He did not think that Mr. Hepburn had really asked any question, but he had drawn attention to the utilisation of biochemical knowledge, with success, in his practice, of which they were very pleased to hear. Mr. Hepburn had, however, suggested two problems that might be investigated from the biochemical aspect, namely, the tendency to the incidence of navel-ill, and retained placenta. The former would be a joint investigation with the bacteriologists. The investigation of the biochemical condition of the body fluids in cases of retained placenta had already been commenced, as far as they could approach, by the A.D.R.A. Dr. Wooldridge, in the limited time at his disposal, had given them a very brief summary of the vitamins, and although Dr. Dryerre had not dealt with these very much in his introductory paper, he might say that they had not lost sight of their application in some of their problems, and it might not be inopportune for him to mention that they had been employing vitamins of relatively pure composition and also cruder preparations in connection with enzoötic abortion in ewes. He did not intend to deal fully with that, because his time was limited, but he had a suspicion that a deficiency of vitamins might be of importance in this condition. His attention had been called to vitamins A, D and E as being vital factors, and as showing how careful one must be in coming to an opinion and how careful one must be in having a sufficiency of trials, he would, with their indulgence, refer to certain results which had been obtained and which had not yet been published.

In a farm in Perthshire, the incidence of abortion in the flock was 14 per cent. The flock numbered roughly 700 sheep. He had been

allowed to get 40 of these sheep to be experimented upon, by giving them vitamins, and as a preliminary step he decided to give them all three vitamins, A, D and E, the idea being that if any beneficial result accrued they could then give the individual vitamins to determine which was the responsible factor. In these 40 sheep, only one aborted, and that one might have been due to accidental causes, such as dropping into a ditch or being chased by a dog, but counting that abortion it gave a value of P=·08, which meant that the chance of this abortion occurring purely fortuitously was 1 in 12½. That was not statistically significant, but it was statistically suggestive, and he had decided last year to extend the experiment over a larger area and to give the vitamins separately and in combination. Accordingly, about 950 sheep were treated, and roughly 1,500 were used as controls. These were distributed over six farms in different parts of Scotland — Perthshire, Stirlingshire, Dumfriesshire and Berwickshire. Careful note had been made of what was administered in each case, and he would refer, first of all, to the flock in Perthshire, where the original experiment was being conducted. The sheep there were given vitamin E alone, and in the 40 sheep that were set aside and which, incidentally, were not the same 40 ewes as had been dealt with the previous year, not one aborted. The abortion rate in the remaining 650 control animals was 12 per cent. That is, about 80 sheep had aborted in the rest of the flock. Had he been concerned in carrying on that observation alone, he might have been justified in crying *Eureka.* He thought that he had found the cause of the abortion, but when he looked round at the other flocks and at what was happening there his enthusiasm fell somewhat. He would not say that vitamin E had nothing to do with this abortion, but the evidence coming in from the other areas where E alone, and E, D and A together had been given was not sufficiently encouraging for one to be justified in saying that a deficiency of vitamin E was the cause of the abortion. He merely mentioned that in passing, to show that they were working along these lines and also to show the dangers that might accrue from using too small a number of animals. Those who were working in research were aware of that. They must use large quantities if they were to have results that would be of statistical importance and significance. Dr. Wooldridge had also spoken about hormones and had referred specifically to one, namely, thyroxine. Well, they had been using that in their experiments at Moredun. There was a condition affecting sheep known as scrapie, found particularly in the South of Scotland and the Borders. There were certain indications which pointed to the fact that these animals were suffering from an excessive activity of the thyroids. That was borne out by the fact that in every sheep which he had examined the thyroid glands were enlarged, and so also were the adrenal glands. He administered daily doses of thyroxine and ran the sheep along with control animals that were not under similar treatment. The results were negative in so far as the symptoms of scrapie were concerned. These observations had lasted over a period of many months, and one had to concentrate on them before branching out on another line of investigation. He mentioned the other line because it had a bearing on some of the subjects mentioned by Dr. Wooldridge. The enlarged adrenal glands led him to examine them for the adrenaline content, and he found that although the adrenaline percentage was a little less than was found in the normal gland the total amount of adrenaline was greater than was found in the normal sheep. The symptoms of scrapie were very suggestive of excitement—excessive stimulation of the sympathetic nerves. He had experiments in view whereby, if they fed sheep on a course of ephedrin (which drug they had already heard of from Professor Boddie) they might simulate a condition that was alike to scrapie. Ephedrin was derived from *Ma Huang,* and he had obtained a supply of this plant, which was to be administered to the experimental sheep. If they could produce the condition they were a long way towards ascertaining the cause and effecting a cure. He might also mention vitamin A. They did not lose sight of the possibility of there being a deficiency of vitamin A in some diseases. Its absence was supposed to increase the tendency to infection. He need not go into the theory of that, but it was assumed to be due to a weakening of the epithelial tissues. By weakening of the lining of the alimentary canal, organisms that could not normally gain admission to the tissues were then able to penetrate through. It had been suggested by Professor Clark, of the Therapeutic Department of the University, that the grass sickness of horses might be due to a deficiency of vitamin A. Last year, along with assistants, he had gone up to Angus district and there, with the very willing assistance of practitioners and people in charge of the carcases, they obtained the livers from horses that had just died from grass sickness, and they also obtained livers from horses that were normal in their constitution, and which had been killed because of old age, and there was no significant difference between the vitamin A content of the livers from these different animals. If his memory served him aright, the ratio was 12 to 14—twelve units of A in the case of grass sickness livers and 14 in the case of the normal livers.

Professor Boddie had spoken about the relationship of biochemistry to the veterinary practitioner and had hoped that there would be no dissociation between the two, or no isolation. It was his sincere hope that there would be no dissociation, but that there would be co-operation between the field and the laboratory. He was putting forward that day a plea for co-operation between the practitioner who saw the animals and the laboratory worker who had facilities for investigating the specimens submitted to him, and it was certainly his policy to co-operate in every possible way with the clinician and to try, as far as possible, to interpret the conditions in reference to the living animal. He was aware that there were many academic points that had to be tackled on the way, but it was his object to tackle them and try and get solutions that would be of economic importance. To take, as an example, the deficiency of vitamin E in hill sheep causing abortion, no great purpose would be served, for instance, by him saying it was due to vitamin E and that they would have to use a concentrate that would cost them ten shillings per sheep per season if they wanted to prevent abortion. There would be no sense in that, but when the academic side had been probed the economic side would be probed in order to evolve practical means to combat this condition.

Professor Boddie had asked if all cases of pine were due to iron deficiency and iron deficiency alone. He might have misconstrued the question, but he would read from his paper, which had been circulated to all members of the Congress: "It was soon evident that in certain cases there

were causes other than deficiency of iron responsible for the condition." That was printed in his paper. He was aware that there were many conditions of pine which were not due to iron deficiency, but in the cases where a deficiency of iron existed in the blood, an administration of iron alone was quite sufficient to give a rapid cure and an effective and permanent cure. In that connection he might perhaps read an extract from a letter from one of the veterinary profession—a practitioner who had been troubled with wasting in animals, and who was veterinary adviser to a large estate, and, incidentally, had a large practice surrounding the estate. The owners of the estate were worried about the deaths of their animals. In one year alone 15 had died; finally they had got into touch with the Animal Diseases Research Association in order to see if they could throw any light on the matter. He need not detail what had been done, but would read a letter received from the practitioner in April of this year. Naturally he would leave out names where these occurred. The practitioner wrote:—

"That shorthorn herd at . . . . was in an appalling state. He buried 15 yearlings in 1932 and seven in 1933, and when I saw the remainder in November, 1933, they were just skin and bone. From after commencing iron they began to improve, and now you would not know they were the same cattle. Every beast on the place is getting it. On the farm of . . . . where cross calves are bred, when they reached a year old they got quite a yellow colour instead of being black or brown. All the animals on the farm are now on iron, and the owner says he never had his stock looking so well, and getting less food than in previous years.

"I met another client the other day who had asked me some months ago to send him 1 cwt. iron. I asked him if it had done any good. He said, 'Well, it stopped the abortion.' It appears that all his cows that were tied up got iron, and none aborted. Four others in a fold that did not get it all aborted. That is not exact proof that the iron was the preventative, but one can understand that if the hæmoglobin is deficient to the extent of 30 to 50 per cent., the bacilli might get a better hold. On quite a number of small farms and crofts I have advised the use of iron, and there is not the least doubt it does good."

He had written to the practitioner just before the Congress and had asked if he was making good progress with the iron therapy and if there had been any relapses, and the practitioner had replied:—

"There were two farms where 'pine' was very bad. Since these animals got iron, they have thriven like mushrooms. ———'s cattle, as I wrote you before, were in an extreme state of emaciation. They have all had a ration of iron since last November and they are now all in splendid condition. The same can be said of ———'s. He told me the other day that he had never had his young stock in such good condition."

He just quoted that letter because it was the experience of a practical man who was applying the findings that had been made in the A.D.R.A. laboratories upstairs, and he thought that would perhaps answer Professor Boddie's question in respect that if it was not due to iron deficiency why did iron give such remarkable results? He might also, at that stage, reply to a query by Mr. Blount as to why he recommended ferric oxide, owing to its relative insolubility. He might give some information with regard to that. When they examined a blood and the evidence showed that the animal was *very* poor in hæmoglobin and was obviously dying, he told the practitioner to administer one of three things, namely, iron and ammonium citrate, saccharated carbonate of iron, or sulphate of iron, because in certain areas there might be difficulty in getting one or other, and he asked the practitioner to give one of these as a drench every day for a fortnight, and at the end of the fortnight to switch over to ferric oxide. Why ferric oxide? For the main reason that it was an economical commodity to use. The animal was able to extract from it sufficient for its wants, and if they administered it at the rate of 1 oz. per day, given in any form, the animal would get from it all the iron it wanted. In the gut the animal would extract from the ounce something of the order of a few grains and the rest of the iron would be passed through the animal, to be deposited on the pasture. In course of time the iron would again pass through the same journey, so they would see how economical it was. (Laughter and applause.)

Professor Boddie had crossed swords again on the question of milk fever, and had said that Dr. Dryerre had shifted his position. He did not quite agree that he had shifted his position, but he was going to touch on something more pertinent, with a bearing on the question. The question was: Did the deficiency of blood calcium cause the milk fever, or was that merely incidental to the milk fever? He had in his hand a few notes which he had made of an experiment carried through by Carlström, in which he had administered to a cow of 370 kilograms weight a certain quantity of sodium oxalate. He gave it 500 c.cs. of 5 per cent. sodium oxalate, and followed the blood from the time previous to the injection until about five hours later, and there had been a steady fall in the blood calcium from the initial figure of 11·2 mg. down to 2·7 mg., at which stage the animal died. He had taken the blood calcium at intervals, and the readings were 11·2, 9·7, 9·2, 8·8, 8·5, 5·7, 3·1, 2·7 mg. per 100 c.c. At 3·1 mg. of calcium the cow could not rise, but toppled over. If one at that stage injected into the animal calcium gluconate it got up, wagged its tail, walked away and chewed the cud. He thought that bore upon the milk fever etiology. Professor Boddie had also touched upon a point with which he agreed, and if Professor Boddie had been out at Moredun the previous day he would have heard Dr. Dryerre refer to it. Professor Boddie was of the opinion that the biochemical changes followed the disease rather than caused the disease. He quite agreed that in some cases there might be biochemical changes in the blood which one could at present attribute to the disease, but it might be that these changes were the cause of death. At this stage he could perhaps quite profitably show them the diagram which he had used the previous day in regard to grass sickness. That diagram dealt with four of the constituents present in the blood of a grass sickness case. These changes in the blood condition had been registered at intervals of twelve hours. He pointed out that there were some rather varying figures obtained from the condition of the blood in grass sickness. Last year, when he had been up in Blairgowrie, he took pains to find out when the animal was taken ill, when the blood was withdrawn and when the animal died. He found then that in the initial stages of grass sickness it was only occasionally that they would find any essential change in the blood. He would show them what occurred before death. There in the

diagram were the four constituents—glucose, inorganic phosphate, hæmoglobin and calcium. The calcium content fell, and all the other constituents rose. He indicated the highest glucose in a grass sickness case and the highest glucose in a normal case. The blood picture was undoubtedly one of dehydration. The obvious question was: If grass sickness gave an anhydræmia why did the calcium go down? The calcium was present normally in the blood in a saturated solution, and whenever they removed the water the calcium was precipitated and the precipitation was increased by the increase in the phosphate, which would upset the stability and throw it out of balance altogether. The blood was withdrawn at intervals of twelve hours, and the animal died about one hour after the last specimen had been removed.

He quite agreed that in many cases the biochemical changes succeeded the disease and were not necessarily the cause of it, but the blood picture which they got in grass sickness suggested that the condition of this tissue was a potent factor in causing the death of the animal. Owing to its excessive viscosity it would become impossible for that blood to pass through the cerebral capillaries. In connection with the work which Dr. Gordon was doing, it might be that an investigation could be carried through in order to show if the clinical condition which he had produced in the animal would also be reflected in the chemical condition of the blood, because they had had hundreds of grass sickness cases and the blood picture was so typical that unless they got a blood picture like one of these cases the condition would not be truly that of grass sickness. He observed that Professor Boddie had given them the offer of blood samples and that was a co-operation which he was very pleased to get from any practitioner. Many times they wanted samples, and he would be only too pleased to send containers, with instructions, to practitioners. Mr. Steele Bodger had very magnanimously withdrawn the suggestion which he had made at the Royal Society of Medicine, doubting the beneficial effect of calcium gluconate in milk fever cases, for which Dr. Dryerre gave him his thanks. He knew that Mr. Steele Bodger was getting success with his calcium gluconate treatment and was glad to hear him acknowledge that. He need not say anything more on this point, but he had had a note handed to him by Mr. Steele Bodger, in which he stated that it was rather an important point when one was introducing the calcium gluconate solution that they should not force it. It ought to be allowed to go in, if possible, by gravity and any convenient receptacle that would hold the liquid and allow it to flow along the tube into the needle would certainly tend to prevent any possibility of sloughing or local irritation.

Mr. Blount's point in regard to ferric oxide he had already dealt with, but Mr. Blount had asked a question of Dr. Wooldridge, as to whether the yellow colour in cod-liver oil was a measure of its vitamin A content. Dr. Wooldridge had asked him (Dr. Dryerre) to reply and say that the answer was in the negative.

The remaining point introduced by Mr. Blount was with regard to magnesium compounds. In his opinion there was no special virtue in using any particular magnesium salt. In many experiments which they had been conducting at Moredun he had found that any magnesium salt would be effective. If he was to choose between magnesium salts, he would choose magnesium sulphate, for two reasons—that they could get it in any town in Great Britain or the Irish Free State—(laughter)—and it was therefore readily available, and it would keep indefinitely without going bad. Magnesium chloride was hygroscopic and one had difficulty in weighing out the doses unless one did so immediately one received it and kept it in solution.

He thought he had touched on all the points of the discussion, with the exception of one of practical importance. When they got blood sent into the laboratory they preferred to get two samples, namely, one of unclotted blood and one of clotted blood. They therefore sent out two bottles to practitioners who desired them. One was filled with blood and left to clot, and the other contained a white powder which preserved the blood in a liquid condition. If any of them were interested in having blood examined, and they got into touch with the A.D.R.A., they would be sent a supply of bottles with printed instructions.

In conclusion, Dr. Dryerre observed that although working on the chemical side, where they were dealing essentially with hard facts and with things which were as a rule to be seen and valued and estimated, they had not lost sight of the fact that they did not know what life really was. Although they could express certain phenomena in chemical terms, they had not yet got to the solution of life, and he subscribed to the view expressed by the Frenchman, Bichat, who said that life was the sum of the vital properties which withstand the physical properties, and it was their business to examine the physical properties and see how these affected the life of the animals. He thanked them for their attention.

BRITISH INDUSTRIES HOUSE: PROPOSED VETERINARY CENTRE

Great progress is being made at British Industries House, Marble Arch, London, in the formation of a wholesale buying centre for goods of British manufacture. A very interesting section in the great building is the Medical Centre, which was officially opened on July 18th, when the interest shown resulted in a recommendation by the Medical Advisory Council (under the guidance of which the centre is being conducted), backed by the directors of British Industries House, to construct in full detail the layout and complete equipment of the most up-to-date operating theatre suite and hospital ward on 12,000 square feet of the ground floor.

The primary objects for the establishment of this Medical Centre are: (1) To provide facilities in one central building for manufacturers to exhibit objects and material used in connection with hospital equipment and administration and by the medical profession generally, and (2) To aid the State in the reduction of unemployment by the development of British industry, more particularly in affording facilities for buying at a common centre.

The suggestion has been made by the organiser of the Medical Section of British Industries House—and we welcome it warmly—that the facilities now afforded by the Medical Centre to members of the medical profession should be extended to members of the veterinary profession by the establishment of a Veterinary Section. It is stated that such a section would form a suitable extension to the existing layout of the Medical Section, and it is certain that the inclusion of veterinary requisites at British Industries House would be of considerable use and convenience to veterinarians. We are glad to learn, therefore, that there is every likelihood of a Veterinary Centre being established in the near future.

Clinical Report

SOME NOTES OF A CASE OF POISONING BY HYDROCYANIC ACID IN REARING CALVES

F. J. EARDLEY, M R.C.V.S.
Gloucester

An urgent message to attend was received from a farmer of December 24th last.

History.—The calves in question, six in number, and about three months old, were fed at 7 a.m. and were left apparently in good health. At 8.30 a.m. one was found dead; this was examined by the owner, and as nothing was found to account for death, it was therefore buried. At 9.30 a.m. another calf was found to be lying on the floor of the box, and it was at this stage that I was requested to attend.

On my arrival at about 9.45 a.m., I found the calf to be in a state of collapse. The temperature was 99·5, the pulse very rapid and wiry, and respiration was laboured. This calf was killed, and a *post-mortem* examination made immediately. The only lesion to be found was a slight discolouration of a portion of the wall of the rumen.

Diagnosis.—Poisoning, probably by hydrocyanic acid—which opinion was given on the excessively laboured respiration during life, for no characteristic smell could be detected on *post-mortem*.

The ration consisted of linseed cake, Egyptian cotton cake, and home-grown oats in equal parts by weight. Hay was allowed, and the calves had access to water. The corn ration was fed dry. I cannot state how much cake each calf received but, the pen of six were fed from one trough, therefore the quickest feeder would get the most. The cake was bought in slabs, and the crushing and mixing were done at the farm.

The owner was advised to have an analysis made, but declined to have this done on the grounds of expense. He was therefore advised to exclude linseed cake from the feed.

Nothing further was heard until January 15th, 1934, when the owner telephoned to say that another calf had been found dead that morning, about two hours after feeding. A *post-mortem* examination was made, and this time analysis was agreed to. The following were therefore submitted to the analyst—blood, heart, kidneys, and the entire stomachs and contents. A sample of the linseed cake was also submitted at the same time.

The following are extracts from the analyst's report:—

Post-mortem Appearances.—(1) Blood was of an oily appearance; (2) kidneys were dark in colour; (3) stomach lining was slightly inflamed; (4) stomach contents appeared to be composed almost entirely of linseed cake.

Chemical Analysis.—Blood showed the presence of 0·36 grains per pint of hydrocyanic acid. Stomach contents showed the presence of 0·04 grains per lb. of hydrocyanic acid before incubation, and 0·06 grains after incubation.

Conclusions.—The analysis shows that the linseed cake contains cyanogenetic glucosides which, when liberated by ingestion, produce 2·65 grains per lb. of hydrocyanic acid. The analysis of the stomach contents shows that practically all the hydrocyanic acid present in the linseed cake has been liberated. The blood shows the presence of hydrocyanic acid.

After about one month, the owner again included linseed cake in the calf feed, but no further trouble has been experienced. It is assumed that a portion of one particular consignment was contaminated with the cyanogenetic glucosides.

Abstracts

[The Control of Bovine Tuberculosis in Germany by the Methods Advocated by Ostertag. (Trans. title.) Pröscholdt, O. (1934.) *Berl. Tierärztl. Wschr., 50,* 185-186. Rautmann, H. *Ibid.,* 186-189.]

The writers contribute their appreciation of von Ostertag for his services in connection with the eradication of bovine tuberculosis in Germany. After studying the various schemes practised in other countries, such as that in America and that of Bang in Denmark, Ostertag proposed his voluntary eradication scheme in view of the fact that it seemed the only practical method under the conditions existing in Germany. On his advice and under his direction his scheme was adopted in 1900 by the East Prussian "Holländer" Herd Book Association and subsequently by other districts. Soon after the initiation of his campaign against tuberculosis, Ostertag founded the Bacteriological Institutes under the control of the Chambers of Agriculture in different provinces. These Institutes undertook this work as the main part of their programme and in addition disseminated knowledge on the diseases of animals and furthered research work.

In the space of thirty years, considerable success has been attained in the eradication of so-called "open" cases of tuberculosis and at the present time about half the herds in certain provinces of Russia are subjected to clinical examination. The application of tuberculin for the detection of infected animals is limited to young stock reared on heat-treated milk and the basis

of the scheme is the routine clinical examination of all animals and the bacteriological examination of milk and bronchial secretion. The merits of Ostertag's method for the control of tuberculosis are ably expounded by Rautmann, who has had considerable experience with tuberculosis control in Saxony. Rautmann commends the principles of eradication proposed by Ostertag because of their adaptibility in a country where bovine tuberculosis is widely disseminated and where resources for compensation are limited. He considers that the system recommended by Bang is not adaptable in badly infected herds, and there is difficulty in maintaing a herd free from sources of re-infection. Furthermore, Rautmann is of the opinion that control measures which have as their basis a test depending on allergy to tuberculin are not satisfactory. Not only does the test fail to detect advanced cases of the disease, but its application may condemn about 7·8 per cent. of healthy animals; moreover, the lesions in 29·4 per cent. of reacting animals are usually confined to lymphatic glands and there is no reason to believe that these animals are infective. Similarly, the application of the complement fixation test is not likely to supersede thorough clinical examination and bacteriological examination of discharges which should include the milk and bronchial secretion and have as their aim the detection of all animals which are actually excreting tubercle bacilli.

S. J. E.

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[Statistics of the Occupations of Veterinary Surgeons in Prussia. (Trans. title.) *Berl. tier. Woch.*, 1934, *50*, 19.]

The following information is taken from a summary relative to the above appearing in the course of this statistical review of the occupations of veterinary surgeons in Prussia for the year ending July 1st, 1933:—

(1) Government Veterinary Surgeons ...		533
(2) Engaged in Teaching		81
(3) Army Veterinary Surgeons		147
(4) Slaughterhouse Veterinary Surgeons ...		613
(5) Veterinary Surgeons engaged in special duties, in Scientific Institutions, etc.		144
(6) Unofficial Veterinary Surgeons:—		
(*a*) in General Practice	2,616	
(*b*) retired from office, but in private practice	338	
(*c*) out of practice	239	
		3,193
Grand total		4,711

In addition to the 613 whole-time slaughterhouse veterinary surgeons, 1,985 veterinary surgeons in private practice are also engaged in meat inspection.

[Investigation on the Morphology and Function of the Guttural Pouches in the Living Horse. (Trans. title.) Gratzl, E. *Wien. tierärztl. Mschr.*, XXI, *3*, 65-78, und *4*, 97-106.]

This article is abstracted in *Tierärztl. Rundschau*, XL, 22, 375, as follows:—

Gratzl first gives an historical survey and then a description of instruments and technique, as well as endoscopic pictures of the guttural pouch of the horse. The investigation was carried out on about 200 healthy horses, Wirth's laryngoscope being employed and two specially constructed beak-shaped lamp holders being used for the introduction of the instrument into the guttural pouch. The causes of failure in guttural pouch endoscopy include impassable nares, congenital abnormalities of the pharynx and of the guttural pouch, too short a pharynx, too close a position of the covering valve to the throat wall, and too small a lateral twist of the instrument used. Concerning guttural pouch endoscopy one can say in general that it is a method of investigation which is nearly always successful after some practice and is free from danger if certain precautionary measures are taken. In the healthy guttural pouch the structures visible by endoscopy include a part of the dorsal undivided compartment of the pouch and of the caudal sac, the medial and approximately the upper half of the lateral division of the pouch, the larger branch of the hyoid bone, part of the temporal bone, the base of the skull with the tuberculum musculare, the tuba auditiva, the mastylo-hyoideus, the digastricus, the pterigoideus medialis and lateralis, the external carotid artery, and the external and internal maxillary arteries. In 200 horses with healthy guttural pouches five showed a retraction of the covering valve from the lateral pharyngeal wall. The closure of the pouch was examined in 100 healthy horses and in only three cases was it found air-tight. From these observations on the movement of the guttural pouch Gratzl draws the conclusion that the pouch has an important function during the act of swallowing. This is confirmed in the occurrence of disease of the pharyngeal wall and especially in the disturbances in swallowing so characteristic in the horse.

A. B. O.

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[Cannibalism in Fowls Associated with a Deficiency of Animal Protein in the Diet. (1934.) Hart, L. *Aust. Vet. Jour.*, February, Vol. 10.]

Malke (1930) describes the occurrence of deaths in laying hens due to cannibalism resulting from a diet markedly deficient in animal protein. When the cloaca is still everted immediately after an egg has been laid, other hens attack this organ, picking at it viciously. The subsequent hæmorrhage weakens the victim

which falls to the ground; the cloaca is severely lacerated and the major part of the bowel may be torn out and devoured.

The author records two cases of deaths in poultry which he diagnosed as being due to cannibalism. The history was that birds were being lost, all of which bled freely from the anus before death. On *post-mortem* examination it was found that the feathers round the anus were stained with blood, that the comb, wattles, liver and spleen were pale and that there were clots of blood in the abdominal cavity. Various degrees of mutilation of the intestine, cloaca, anus, and posterior part of the oviduct had occurred, in one case almost the whole of the large and small bowel being missing. In both cases where the outbreaks occurred the general management was good but the diet was deficient in animal protein. The diet in the one case consisted of wheat, bran, pollard, green stuff, and a small amount of commercial concentrate of doubtful value; in the other it consisted of wheat, bran, pollard, green stuff, and bone meal. The addition of five per cent. meat meal to the diet was recommended in each case and no further deaths from cannibalism occurred.

J. S. S. I.

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[**The Small Fowl Tapeworm** (*DAVAINEA PROGLOTTINA*) **and its Control.** (Trans. title.) Wetzel, R. (1933.) *Arch. Geflügelk.*, 7 (1), 14-22.]

Wetzel gives an account of the life-history of *Davainea proglottina* from a practical standpoint, and makes suggestions for its control. Infected poultry should be removed to new runs, which should be dry and free from slugs and snails. Anthelmintic treatment, which should be left in the hands of a veterinary surgeon, will necessarily be prolonged since, in birds, drugs are greatly reduced in concentration by the time they reach the intestine and, moreover, these minute tapeworms are securely embedded between the intestinal villi. The poultry farmer can best concentrate his efforts on a campaign against the snail and slug intermediaries, bearing in mind that some species live for two or three years. Powdered copper sulphate and Kainit, in the proportion of 1:5 should be applied to open runs at the rate of 2 to 3 cwt. per acre. Bait such as sliced potato, or beer in dishes which are sunk to the rim in the ground may also be used. In the latter case intoxicated molluscs should be removed each morning. Ducks and turkeys can safely be employed to eat the molluses as they are not infected by this tapeworm.

B. G. P.

(Contributed by the Imperial Bureau of Agricultural Parasitology.)

N.V.M.A. Divisional Report

EASTERN COUNTIES V.M.A.*

SUMMER MEETING AT GREAT YARMOUTH

The Summer Meeting of the Eastern Counties Veterinary Medical Association was held at the Royal Masonic Assembly Rooms, Great Yarmouth on Thursday, July 12th. The President, P. J. Welch, Esq., was in the Chair. Prior to the meeting about twenty members and their ladies partook of luncheon served in the Royal Masonic Rooms. After luncheon a short business meeting followed.

In addition to the President, the following members signed the attendance register: Messrs. J. A. Buckingham, V. Boyle, A. Beynon, B. A. Claxton, W. H. Dennett, J. G. E. Gallie, T. G. Heatley, D. S. Jack, W. F. Loveless, G. T. Matthews, N. F. Pollock, J. Reid, E. Brayley Reynolds, W. Shipley, H. P. Standley, Senr., W. K. Townson, W. Turtill, J. F. Thurston and the Hon. Secretary.

The Minutes of the Fifty-eighth Annual General Meeting, as published in *The Veterinary Record*, were taken as read and signed.

Correspondence.—(1) Letters regretting their inability to attend were received from Messrs. H. Buckingham, E. A. Burgon, Junr., J. Cochrane-Dyett, F. L. Gooch, W. Howes, H. V. Low, C. Nesling, R. B. Smith, P. R. Turner, W. H. Wortley and W. Waters.

(2) From the Royal College of Veterinary Surgeons asking the Association for a donation towards an endowment fund for the Library of the College. It was decided to make a donation of £5 5s.

(3) From Mr. C. W. Townsend, Long Stanton, tendering his resignation from the Society. It was agreed that Mr. Townsend's resignation be accepted with regret.

(4) From Mr. C. C. Nesling, proposing that the Annual Subscription be raised to £1 1s. It was decided that this matter be discussed more fully at the next Annual General Meeting.

It was agreed to hold the Autumn Meeting at Bury St. Edmunds in October, and the Secretary was instructed to approach Professor Wright, Royal Veterinary College, London, to come down and give a demonstration.

The President then gave a short address.

A letter was read from H. V. Low, Esq., reporting on the Royal Institute of Public Health Congress at Norwich.

Discussion.—A discussion was then held on a scheme (particulars of which are printed below), for the employment of locum tenentes and assistants, brought forward by Mr. N. F. Pollock, who pointed out the difficulties practitioners met

*Received for publication August 13th.

with in engaging a reliable locum tenens, especially in cases where immediate assistance was required. After considerable discussion it was decided to send the proposals forward to the N.V.M.A. for their consideration.

Outline of a Proposed Panel of Locum Tenentes and Assistants

A panel to be instituted by the N.V.M.A. of those of its members seeking engagements as locum tenentes or assistants.

Panel to include necessary particulars of each member enrolled, *viz.*, name and permanent address, date of qualification, age, experience of practice during the preceding twelve months.

Panel Register.

To minimise cost of maintenance the register could be printed in this way. Assuming that the scheme operates from January 1st, 1935, the booklet would contain the names and particulars of each member. The general list of individual engagements could be conveniently kept on a card index by the secretary. On engagement, each member to acquaint the latter with the facts, and notify him when again available on termination of said employment so that the register is always up-to-date.

When a practitioner asked for a copy of the register those members not then open to engagement could be readily ticked off. Those shortly to be disengaged could be detailed by means of slips showing the duration of their existing engagements. The remaining names would be of those immediately available.

Thus when a practitioner wanted the services of a locum tenens or assistant, he could, on application to the panel secretary, obtain a list of members open to engagement immediately and in the near future.

To cover the cost of card indexing and printing involved, a fee would be charged for each copy of the register supplied; also for enrolment thereon.

The scheme would tend to ensure regular employment for young graduates and enable them to acquire capital, besides being an incentive to efficiency.

It would be an agreed condition that a member would be debarred from starting a new practice within the recognised area of any practitioner by whom he had been employed, without the latter's concurrence.

Inclusion in, and benefit from, the scheme to be confined to members of the N.V.M.A.

Bowls Tournament.—At the conclusion of the business meeting the Bowls Tournament for the Shipley Cup was contested. This resulted in a win for Mr. W. H. Dennett, who also carried off the honour last year. The subscription on behalf of the Victoria Benevolent Fund in connection with this Tournament amounted to £3 4s.

At the conclusion the President and Mrs. Welch entertained members and the ladies to tea. The afternoon ended with a hearty vote of thanks to the President and Mrs. Welch for their hospitality.

H. P. Standley, Jun., *Hon. Secretary.*

Notes and News

The Editor will be glad to receive items of professional interest for inclusion in these columns.

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DIARY OF EVENTS

Sept. 3rd.—Meeting of the Editorial Committee, N.V.M.A., at 2, Verulam Buildings, Gray's Inn, W.C.1, at 4.30 p.m.

Sept. 7th.—Meeting of the Southern Counties Division, N.V.M.A., at Bournemouth.

Sept. 24th-25th.—Examination for award of Jubilee Memorial Bursary.

Sept. 26th.—Meeting of the Lancashire Division, N.V.M.A., at Manchester.

Oct. 3rd.—R.C.V.S. Committee Meetings.

Oct. 4th.—R.C.V.S. Committee Meetings. Victoria Veterinary Benevolent Fund Council Meeting.

Oct. 5th.—R.C.V.S. Committee and Council Meetings.

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INTERNATIONAL VETERINARY CONGRESS

RECORD ATTENDANCE AT NEW YORK

Dr. Mohler Elected President

Veterinarians from all parts of the world were in New York on Monday, August 14th, when, at the opening session of the Twelfth International Veterinary Congress, at the Waldorf Astoria, Dr. Hoskins, the general secretary, announced a record enrolment for the Congress, reporting that a total of 2,815 ordinary members, including 655 from 57 foreign countries, had signified their intention to attend. The previous record was 1,546 at the London Congress in 1930.

For the first time in the history of the Congress an American president was elected, the honour being bestowed upon Dr. John R. Mohler, chief of the bureau of animal industry of the Department of Agriculture, in succession to Dr. E. Leclainche, Director of the International Office of Epizootics, Paris. More than 1,000 persons attended the opening session of the Congress, of which President Roosevelt is patron and Henry A. Wallace, Secretary of Agriculture, is vice-patron.

Other officers elected were Dr. C. P. Fitch, of St. Paul, first vice-president; Dr. Adolph Eichhorn, of Pearl River, New York, second vice-president; Dr. C. J. Marshall, of Philadephia,

third vice-president; Dr. H. Preston Hoskins, of Chicago, general secretary, and Dr. Mohler, treasurer.

Mr. Wilson was Mr. Wallace's representative at the Congress. He said that the veterinarian is becoming increasingly important in assisting in solving sanitation and health problems, especially now with the present drought in the Middle West.

"By reason of the international veterinary intelligence system the private veterinary practitioner, in his usefulness in our home and on our ranges and farms, has advanced the standard of efficiency in many amazing ways ahead of 'human doctoring,'" said Mr. Wilson. "The public veterinary practitioner, local, state and national, has become a vital force in public affairs. This international veterinary Congress lays the ground-work for nation-wide, world-wide campaigns in animal diseases, eradication, prevention and control."

Mr. Wilson declared that the veterinarian has become a "defender of human health in battle against those animal diseases communicable to man. He has his vigilant, scientific eye on sanitation. In matters of animal breeding he has become an economist. In his supervision of the affairs of livestock he becomes an administrator. His inspection of meat alone enables millions of human beings to continue their existence in increasing and safe human endeavour to reach a higher efficiency."

The economic consequences of the service of the veterinarian to individuals in industry and agriculture were incalculable.

Dr. Mohler said in his address that the plans for economic rehabilitation opened many broader and newer fields for the veterinarian. "It is common knowledge that much so-called inspection of meats, milk and related food products—especially inspection of local character—is still performed by untrained workers and wholly unscientific in some of the procedures, thereby giving the consuming public inadequate protection and a false sense of security."

During the rest of the day leading veterinarians from all parts of the world discussed scientific questions at sessions in the grand ballroom and other rooms. These discussions were renewed throughout the week.

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PERSONAL

Mr. Trotter's Successor at Glasgow

The Health and Markets Committees of Glasgow Corporation have unanimously recommended the appointment of Mr. Sydney Gilchrist Abbott, at present chief veterinary inspector and veterinary surgeon for Renfrewshire, as city veterinary surgeon in succession to Mr. A. M. Trotter, who has retired.

Mr. Abbott, who is 37 years of age, has held his present appointment since 1928. He was trained at Glasgow Veterinary College, where he gained the degree of M.R.C.V.S. with honours in 1923, taking first place in his year at the class examinations and winning the medals in chemistry, biology, physiology, and hygiene and medicine, as well as the special gold medal for the best paper on anatomy.

In the examination for the diploma in veterinary state medicine (D.V.S.M.), which is open to all Colleges in Great Britain and Ireland, Mr. Abbott took first place and obtained the highest marks ever awarded for the diploma. During the outbreak of foot-and-mouth disease in 1924 he acted as temporary veterinary inspector with the Ministry of Agriculture and Fisheries, and prior to going to Renfrewshire he held appointments as assistant veterinary inspector in Sheffield and county veterinary inspector of West Lothian. Mr. Abbott has also acted as lecturer in pathology, bacteriology and protozoology in Glasgow Veterinary College.

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New Zealand V.A. Honours Colonel Young.—The New Zealand Veterinary Association, which is affiliated to the N.V.M.A. of Great Britain and Ireland, at its July meeting conferred its Honorary Life Membership on Lieut.-Colonel Dunlop Young in recognition of his services to the profession generally and to New Zealand in particular.

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R.C.V.S. OBITUARY

Blackburn, William H., Linton House, South Hetton, Co. Durham. Graduated Edinburgh, May 23rd, 1894; died July 22nd, 1934.

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Kidd, Frederick, Bagenalstown, Carlow, I.F.S. Graduated Edinburgh, December 17th, 1888; died August 11th, 1934.

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The Late Mr. Frederick Kidd

The Nationalist and Leinster Times, in the course of an appreciative notice, speaks of Mr. Kidd as one of the most popular residents of Bagenalstown and one who "for about 45 years conducted with outstanding ability a most successful and lucrative business, in which his many generous acts of kindness and attention to the stock of the poor and his consideration for their circumstances, particularly during the trying years just passed, will for many years be recounted amongst the people who have reason to regret his demise. In his private life, as well as his professional, he gained the respect and esteem of all who came in contact with him, for apart altogether from his knowledge and skill as a veterinary surgeon, he was an excellent authority on most modern topics, and a sportsman in every sense of the word."

The late Mr. Kidd was fond of fowling, was a good shot, and raced and bred greyhounds both for the track and open coursing.

The funeral to the family burial ground at Dunleckney was the largest seen in the district for many years, and was a striking tribute to the respect and esteem in which the deceased and his family were held.

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VETERINARY INSPECTION IN DENBIGHSHIRE

The *Denbighshire Free Press* reports that at a recently-held meeting of the County Council it was agreed that early consideration be given by the appropriate committee to the desirability of appointing a county veterinary officer to carry out duties required of local authorities under the provisions of the Milk and Dairies and Tuberculosis Acts of 1925.

DEATH OF SIR HARRY GREER

Sir Harry Greer, who resigned the directorship of the National Stud last January, died recently at Curragh Grange, after a long illness, at the age of 79. He leaves a name on the Turf widely known and greatly honoured, for after a highly successful stud partnership with Sam Darling he became Steward of the Jockey Club. He had been manager of the National Stud since it was presented to the nation in 1915 by Lord Wavertree, then Colonel Hall Walker, and its success has been mainly due to Greer's skill, experience, and business acumen. The Stud, consisting of 40 mares, representing the best thoroughbred stock in the world, had taken its owner 15 years to collect, and was at the time of transfer valued at £100,000. Among the many good horses bred at the Stud were The Panther, Mount Royal, Royal Lancer, Blandford, Eagle-hawk, Diligence, Poisoned Arrow and Myrobella.

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FOOT-AND-MOUTH DISEASE IN FLINTSHIRE

The existence of foot-and-mouth disease was confirmed on Monday last among cattle and pigs at Prestatyn, Flintshire.

The prohibition of movement Order applies, as usual, to an area of approximately 15 miles of the infected premises, except on the east side, where the River Dee forms the boundary of the restricted area. The area subject to these restrictions lies in the counties of Denbigh and Flint.

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LAYING POISON

At Reedley Court recently, Thomas Thornborrow (74), of Hunter Street, Brierfield, was fined £5 and ordered to pay £2 10s. costs for placing strychnine in his garden. In four months seven cases of dog poisoning had been reported, the neighbourhood being alarmed. A chemist said Thornborrow had purchased 30 grains of strychnine on March 9th, and a further amount on June 23rd. He said it was to destroy rodents and garden pests. A dog which had picked something out of defendant's garden collapsed and died from a large dose of strychnine. The police said they found Thornborrow was the only person to buy poison in Brierfield for a number of years. He admitted that, after finding cayenne pepper was not enough to stop cats and dogs coming into his garden he had put strychnine on a piece of fish. A police inspector said this had caused a scare in the neighbourhood.

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OUTBREAK OF FOWL CHOLERA IN NORFOLK

An outbreak of fowl cholera involving one farm in the duck fattening district of Norfolk has come to the notice of the Ministry, and the identification of the disease has been confirmed at the Ministry's Veterinary Laboratory. According to the information received, the outbreak has been responsible for a heavy mortality among ducks on the farm in question.

This outbreak indicates the persistence of infection in a part of the area in which the epidemic of fowl cholera occurred last year, and with a view to preventing the spread of infection the Ministry has issued to the Press information as to the steps to be taken by poultry keepers in the event of unusual mortality among their birds.

Correspondence

Letters to the Editor should reach the Office not later than by the first post on Tuesday morning for insertion in following Saturday's issue.

All correspondence must bear the name and address of the contributor for publication.

The Editor does not hold himself responsible for the opinions of his correspondents.

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CATTLE DISEASES COMMITTEE'S REPORT

To the Editor of the Veterinary Record

Sir,—To appreciate the alarm felt by veterinary practitioners at the proposals put forward by the Cattle Diseases Committee of the Economic Advisory Council it must be remembered that these are not an isolated instance of encroachment on the practitioner's work. Since the War, many adverse circumstances have operated against him. First, there was the virtual disappearance of the horse. Veterinary practice has never fully recovered from that staggering blow, and though the great increase in canine work has helped, it has not nearly made up, except in a few instances, for what was lost with the horse. Again, many veterinary surgeons depended very largely for a living on work among pit ponies. Trade depression, combustion of oil, and the increasing use of haulage machinery have reduced that to a fraction of what it was. Tuberculin testing, too, was systematically done by practitioners for many years, but that has passed or is passing into the hands of whole-time officers. The treatment of milk fever is now so simple and successful that a practitioner is fortunate if he is called to attend half of the cases which occur in his practice. To some, greyhound racing has, of recent years, proved a steady and fruitful source of income, but with a Government displaying quite unsuspected moral susceptibilities it must be agreed that for the practitioner no security lies there. On top of all this come the Committee's proposals, and serious as these are to practitioners, they become more serious still when regard is given to their cumulative effect.

Mr. Steele Bodger, in his letter which appeared in *The Veterinary Record* of August 18th, disposed completely of the assurance which is often given, that the advice of the whole-time officers will induce farmers to call in their private veterinary surgeons more frequently than before. There is no need to labour the point further. If this Report is carried into effect I know what I shall lose by it. Nobody can tell me—I know! And it is the same with other practitioners—they know.

We are often told, not without justice, that this matter will be settled as it affects the country as a whole, and not by its effect on any particular group or interest. If veterinary practice is of importance to the well-being of agriculture, and, consequently, to the nation at large, then any serious blow to it, such as this Committee's recommendations, will have wide and harmful repercussions. It does not seem necessary to dilate in these columns on the veterinary practitioner's usefulness to the country. Practitioners have always formed the largest part of our profession, and so the usefulness of the profession as a whole rests mainly on them. If their work has not justified itself, then our corporate existence is a sham.

In exalting whole-time officers over practitioners, as without doubt they do, the compilers of the Report might naturally be expected to show some adequate reason for their course, some impressive record of past achievement on which to build expectations for the future. After searching its pages one has to confess that comments on the results of inspection so far are

singularly lacking in warmth, and so we come to the "conflict of loyalties," the solitary argument put forward for excluding practitioners from taking any part in the new scheme. Loyalty to whom or to what? Obviously it can only be to the service of the public health on the one hand and to the interests of cattle owners on the other. It follows, then, that these interests are themselves in conflict. That conflict, too, being nation-wide and continuous, is bound to be of far greater social import than any scattered occasional and problematical "conflict of loyalties" on the part of the veterinary surgeon. In the public interest the Committee have advocated the complete socialisation of that part of the veterinary profession which is directly concerned with public health. Why stop at that? If the reasoning was sound it should have been followed to its logical conclusion, namely, the socialisation of the entire dairying industry. I do not necessarily advocate that course myself, I only point out that it is the logical consequence of the Committee's own argument, which they have inexcusably shirked. They have strained at the gnat and swallowed the camel.

In all the discussions it seems to be rather overlooked that essentially this Report is one thing only: a plan for the eradication of bovine tuberculosis. May I recall that a few years ago a scheme of eradication was devised by the Scottish Branch of the N.V.M.A., which was approved by several of the leading agricultural organisations in Scotland and by the principal agricultural newspaper? Also that an almost identical scheme was drawn up by a committee of the Council of the N.V.M.A. for application to England and Wales? Have these schemes been discarded? If so, when, and by whom, and on whose authority? If they have not been dropped what are we proposing to do about them now? I suggest that, without delay, a special committee should be appointed by the "National," including in its numbers Sir John Moore, as a member of the Cattle Diseases Committee, and representatives of the committees which drafted the English and Scottish schemes respectively, and that this special committee should survey the three schemes so that the best features of each might be adopted and combined in an effective and practicable way.

I am,
Yours faithfully,
Donald Campbell.

70, Graystone Avenue,
Rutherglen.
August 21st, 1934.

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THE CONTROL OF CONTAGIOUS ABORTION

To the Editor of the Veterinary Record

Sir,—May I again beg a portion of your space to express my appreciation of Mr. Lornie's article on contagious abortion, in the current issue, and to add my endorsement to the conclusions arrived at therein. I myself have adopted similar methods since about 1921 with very uniform success.

I think that the insertion, under the auspices of the N.V.M.A. or the V.P.S., of summaries of such articles would do incalculable good in dispelling the at present very widespread view that "nothing can be done"—such view being based on unsubstantiated hearsay, which is freely passed round.

"Blood testing and segregation" may sound very scientific as an advisory scheme, but it is really an admission of defeat, and is quite impracticable for application to the majority of herds. It is, however, a strong link in the chain of evidence proving that it is to the general practitioner, with his clinical experience and his various methods of treatment, that the stock owner should immediately, and must, ultimately, turn for the control of this and other scourges that affect his herds.

Yours faithfully,
"Fairholme," William Sewell.
London Road,
Uckfield, Sussex.
August 22nd, 1934.

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A CRITICISM OF THE DOUBLE INTRADERMAL TUBERCULIN TEST

To the Editor of the Veterinary Record

Sir,—Having used this test for the last ten years, I had been led to believe that it was a very accurate one, and far superior to the subcutaneous, but the following account of a recent test has made me change my views.

For several years I have tested a pedigree herd twice yearly, which for the last four or five years has been producing tuberculin tested milk under licence. Any reactor has been eliminated from the herd at once; no fresh animal has been admitted unless tested before purchase; all show animals are segregated at the shows, whilst cattle are not allowed to come into contact with poultry or pigs.

In June, 1930, we had one reactor, since when the herd has passed the test successfully for seven consecutive times.

In July, 1934, I tested 35 animals in the herd, and was surprised to see on July 11th that certain cows which had passed for the last four or five times showed signs of being reactors. Consequently, I invited my colleague, Mr. Blyth, M.R.C.V.S., of Braintree, to be present on July 12th to witness the final reading, the result of which was that we considered two cows to be definite reactors and the other less definite, but bad enough to remove from the tuberculin tested herd.

When the agent reported the result to the owner, the latter decided that, as she did not wish to sell these cows in the open market, where they might infect others, they should be slaughtered. Consequently, it was thought to be a good opportunity to have a thorough *post-mortem* made to prove the efficacy of the test. Therefore I invited the Chief Veterinary Officer of Essex, Mr. J. W. Medlock, and Mr. D. Blyth to be present.

As a result of a most thorough examination of all three carcases no macroscopic lesions of tuberculosis could be found; the intestinal lymphatic gland seemed slightly abnormal and was sent to a laboratory for examination, the microscopical examination of which has proved negative, but a guinea-pig test is being made, and if the result is positive it will be recorded in due course.

Finally, to all appearances, these cattle reacted to the test, and yet *post-mortem* examinations appeared to be negative, and as this herd has to be tested again in December, I am naturally very concerned as to the result.

The tuberculin used this month, as well as in previous tests, was obtained from the Institute of Animal Pathology, Cambridge.

It would be very interesting to hear if other practitioners have had the opportunity of seeing their reactors killed and *post-mortemed* at once.

It is also worthy of note that two of the three cows were bred on the farm from non-reactors, and have never been off the farm.

Yours faithfully,
W. Waters.

38, Head Street,
Halstead, Essex.
July 27th, 1934.